BEFORE THE

PENNSYLVANIA PUBLIC UTILITY COMMISSION

Alexia L. McKnight and Lawrence K. McKnight Complainant,	:	
v.	:	Docket No. C-2017-2621057
PECO Energy Company Respondent.	:	

COMPLAINANT MAIN BRIEF

Alexia McKnight, DVM
Lawrence McKnight, MD
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Chadds Ford, PA 19317
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Date: June 27, 2018

1 CONTENTS

2 INTRODUCTION

In PECO's discovery answer I-2, PECO responds:

> *"Reasonable service is typically accomplished by finding a balance among those various counter-positions."*

We could not agree more. This is exactly what we are asking for. We are asking for what is safe, what is reasonable, and finding the right balance.

However, reasonableness should be to discuss a simple request, and should not require a legal proceeding. Our request is simple and clear - to have an old fashion and inexpensive analog meter, or more specifically, one that specifically does not have a switch mode power supply or radio in it - installed and to negotiate some method to read it, or otherwise get data from so that PECO may generate bills for our power usage.

We are asking this because of a medical condition in Alexia. A perhaps unusual condition, but a condition nonetheless verified by numerous board certified, licensed and practicing physicians. All the physicians that have seen and examined Alexia and know her story support her cause. They agree that an analog meter is the best solution for her.

However, we should perhaps start by clarifying what the request is not. It is explicitly NOT an attempt to have a utility company rip out their entire AMI system and build a new one. Nor is it a request to overturn PA Act 129. Also, we are NOT asking that smart meters be removed from some other persons property, unless that other person happens to fall into conditions like ours. We are not attempting to claim that AMI meters are unsafe to all people. Dr. Davis asserts that he has no doubt that these meters are safe (Tr. 4/13 at 168:1-3). And, he is probably right! For the vast majority of the public. For you. For Dr. Lawrence McKnight, even. But, definitely NOT for Dr. Alexia McKnight, or other patients with Electromagnetic Hypersensitivity (EHS). We are asserting

that it's not safe in the individual sense of Alexia's different biology, or persons with her condition. Her biology is different, and therefore needs special consideration.

We are also not asking for something new, or unfamiliar, or impossible. We are asking for procedures PECO has done in the past, or that could relatively easily be implemented using existing technologies. Something that is clearly feasible, and reasonable. We are open to discuss solutions so long as they appropriately and fully address the safety concern.

Also, we should clarify that we are 'pro se' - not represented by a lawyer. And, in our view, this represents an inherent unfairness in ways to address our complaint. Appropriate legal representation for us would cost hundreds of thousands of dollars, and in a proceeding, such as this we have no chance to get this reimbursed. We are not poor, but we are a small family. We can't afford long drawn out legal proceedings as PECO can with their large team of attorneys. And, PECO, a multibillion dollar company, knows this. They know how to argue in court, and are very experienced in tactics to get any piece of relevant evidence from our side from being presented at all. They know how to intimidate into submission, and have shown that they will use this to the fullest extent. Unfortunately, as pro-se complainants we don't always know these legal details, and certainly miss the legal loopholes and traps. We wish to present our case fairly, but also as fully, and as clearly as we know how. But, presenting fully and clearly has been challenging for us because we don't always know how or when or why things 'legally' count, or when the right time is to add some relevant piece of the puzzle. So, this while probably represent a legal 'due process', in our view it does not always fill the intent of providing a fairness when one side has a huge legal team with near infinite resources compared and the other side is a small family who has only seen a courtroom on a rare day to see what one looked like, and another to sit through a jury duty selection only to be discarded.

3 Background and Procedural History

On 11/30/2015 PECO installed an L&G AMI meter 127832547 on the McKnight Residence at 258 Heyburn Rd., Chadds Ford, PA 19317.

Beginning that day, Alexia McKnight, the complainant, felt acutely ill with a complex range of symptoms consisting of severe headaches, a strange sense of irritability and indescribable inability to be in the house, paresthesia's, insomnia. Although individually each of Alexia's symptoms may have occurred at one time or another, both the severity and quantity of symptoms beginning this day were quite unusual.

The insomnia was so severe that Alexia resorted to sleeping outside in a small sailboat in the side yard despite the cold in the middle of winter, just to be out of the house. She began having difficulty with thinking and memory or what she described as a 'brain fog.' Without obvious cause for unusual changes, Alexia began to investigate alternative causes and found online that many other patients had similar symptoms in associations with electromagnetic Fields (EMF), and that there was military research of a phenomena called 'microwave syndrome.'

On 03/19/2016 The McKnight's hired an EMF consultant, Mr. Sal LaDuca to help figure out why Alexia was having symptoms and make suggestions. This consultant came to the house on 3/21 and found several wiring errors at the McKnight household, but also suggested that the insomnia was related to the high electric fields around her bed, likely containing 'dirty electricity.' Mr. LaDuca stated that he had seen this several times previously, and suggested that shutting off circuit breakers to the wires underneath her bed would fix this

problem. This did work. Alexia was again able to sleep in the house after this point, but only if these circuits were off. Mr. LaDuca also made several recommendations to reduce the 'dirty electricity' (electrical transients on the 60 Hz AC lines) such as swapping out dimmer switches and florescent or LED lighting.

Mr. LaDuca also found a stray voltage issue which was traced back to the PECO incoming power, and suggested that the McKnight's needed to call PECO to fix this.

On 03/21/2016 PECO was notified about the stray voltage issue, and the next day PECO began an extensive investigation into stray voltage issues. That investigation took over 1 year to solve, but became instrumental to the present legal proceeding because it involved removing the AMI meter, then reinstalling it, then removing it again.

Mr. LaDuca came back on another occasion and measured the number of RF transmissions coming from AMI meter, and found them to be more frequent than would be expected. On 05/02/2016 Alexia reported to PECO that the AMI meter may also be operating out of specification.

While Alexia's insomnia had largely improved through Mr. LaDuca's suggestion of shutting off circuits (although she was still waking up with headaches) her other symptoms continued, and she began having new, significant palpitations associated with lightheadedness. Her husband, a physician, checked her pulse and found it irregular and abnormally slow and advised evaluation by a cardiologist. She discussed the situation with her primary care physician, Dr. Peter Prociuk who advised the same.

On 05/23/2016, Alexia saw Dr. Umer Saleem, a Board-Certified Cardiologist and Electrophysiologist. He recommended further evaluation including an echocardiogram and Holter monitor, however the latter could not be arranged immediately because it needed to be an older wired version, and the only version available was wireless that Alexia was concerned might interfere with the study.

In the process of the stray voltage evaluation, PECO technician Russell Brocato removed the AMI meter on 05/24/2016 and replaced it with a jumper plate.

Alexia spontaneously improved within roughly 1 week of the AMI meter removal, despite nearly 6 months with unexplained symptoms. Her headaches resolved, the strange sense of not being able to tolerate the house went away, and her palpitations and lightheadedness started resolving. Within 1 month of the AMI meter removal Alexia's symptoms had disappeared altogether.

A Holter monitor was performed on 6/13/2016, however by this time Alexia's arrhythmia was back to normal and she was not having symptoms. The Holter and echocardiogram study showed normal findings, as did the remainder of Dr. Saleem's workup.

Interpreting Dr. Saleem's records, Dr. Prociuk advised Alexia to keep the AMI meter off the house and use an analog meter instead.

In the process of the stray voltage evaluation, PECO apparently reinstalled the AMI meter on or about 09/09/2016 as determined by readings through to billing.

In this time frame Alexia's symptoms worsened again, however this timing followed an out of state trip that she had taken and she initially blamed the trip for her increased symptoms. She began developing palpitations again and this prompted her to check and find the AMI meter re-installed on 09/21/2016.

On 10/06/2016 Alexia wrote to Craig Adams to see if the McKnight's could have the AMI meter removed, however received only a standard form letter in reply indicating that the meter was required by law.

With no workable response from Mr. Adams, ongoing symptoms, and ongoing stray voltage investigation Alexia asked Mr. Brocato to again remove the AMI meter and replace it with a jumper plate again, and he did so on 11/01/2016. Again, after nearly 2 months of symptoms, including the arrhythmia, Alexia's symptoms resolved. The jumper plate remains on the McKnight house at the time of this writing, and Alexia has had no re-occurrence if she is around the McKnight house. She does get symptoms if she travels.

Alexia wrote another letter to Ms. Tracey Hannan on 03/16/2017 to seek relief under the ADA and prevent the AMI meter from being re-deployed. Dr. Prociuk wrote a letter in support indicating that for Alexia, stating that for her an AMI meter was medically contraindicated.

On 05/08/17 Alexia received a reply from PECO that the federal statutes do not provide a basis for accommodation related to AMI meter installation.

On 08/24/2016 Alexia filed a formal complaint (Docket C-2017-2621057) asking for relief from having the AMI meter reinstalled.

On 08/27/17 Alexia flew to Texas to see Dr. Rea, a specialist in Environmental Health and Electrical Hypersensitivity Syndrome (EHS) to get formal diagnostic testing and help explore additional options for therapy of her EHS. Dr. Rea performed an extensive two-week long evaluation. Among other therapy and recommendations, Dr. Rea advised the use of an analog meter, and avoidance of smart meters.

On 08/30/2016 PECO finished the stray voltage evaluation and finally fixed the issue. The fix involved placing the McKnight's on their own transformer, installing a RONK to separate ground wiring, and also involved resolving an underground wiring leak that was a result of separating the McKnight's to their own transformer, but was secondarily causing brownouts for the McKnight residence.

On 10/04/17 a Notice was issued hearing for 04/10/2018, before Administrative Law Judge Darlene Heep (the "ALJ").

On 02/13/18 the formal complaint was amended to add Dr. Lawrence McKnight, her husband.

On 3/22/17 a teleconference was held where the hearing schedule was changed to include for more time extending from 04/10/2018– 04/13/2018 and including an agreement to allow combined testimony of certain witnesses with the case of Janette Bachman (Docket C-2017-2623504).

At the time of the hearing the McKnight residence remained with a jumper plate, and power usage billing is estimated.

4 PROPOSED FINDINGS OF FACT

4.1 TESTIMONY OF DR. ALEXIA MCKNIGHT

- Alexia McKnight is a doctor of Veterinary Medicine, and works as a Veterinary Radiologist in her home (Tr. 4/10 at 15:19-20).
- Alexia is a complainant. (Tr. 4/10 at 8:8)

- PECO installed a Landis + Gyr AMI meter #127832547 (Tr. 4/12 at 117:18) on the McKnight Residence on November 30, 2015 (McKnight Exhibit 5, PECO Exhibit BU-1, page 2).
- Beginning on November 30, Alexia developed a wide range of symptoms including a headache, severe insomnia, depression, memory problems, and a sense of not 'being able to be in my own house' (Tr. 4/10 at 10:2-15). These symptoms persisted for months, and she eventually developed cardiac arrhythmia associated with lightheadedness (Tr. 4/10 at 12:7). Beyond symptoms of palpitations, she took her own pulse and verified that the pulse was irregular (Tr. 4/10 at 71:12-16).
- The McKnight's hired an EMF consultant, Mr. Sal LaDuca (Tr. 4/10 at 141:23) in March of 2016 (Tr. 4/10 at 20:9; McKnight Exhibit 5; PECO Cross McKnight Exhibit 2)
- Mr. LaDuca identified a stray voltage issue (Tr. 4/10 at 20:9), which PECO needed to fix. PECO's investigation into the Stray voltage investigation led to the AMI Meter removal and replacement with a jumper plate on May 24, 2016 (Tr. 4/10 at 8:15-17), then reinstallation of the AMI Meter on or about September 9, 2016, then removal and replacement with a jumper plate again on (Tr. 4/10 at 9:24) November 01, 2016. (McKnight Exhibit 5) PECO confirms these dates (PECO Cross McKnight Exhibit 2; Tr. 4/11 at 237:15-16), and that PECO technicians did this work (Tr. 4/10 at 211:22; 212:16).
- The McKnight's have taken several steps to reduce 'dirty electricity' and other sources of RF in their home such as (but not limited to) turning off replacing dimmer switches with regular throw switches, avoidance of all cell phone use in the house, and using hard-wired computers rather than Wi-Fi (Tr. 4/10 at 19:23; 85:13-17).
- Alexia's insomnia was significantly improved on March 20 by turning off power to the upstairs circuits (Tr. 4/10 at 20:5-7), despite the continued presence of the AMI meter.
- Alexia's other symptoms persisted until the AMI meter was removed (Tr. 4/10 at 21:4-6).
- Alexia saw a cardiologist, Dr. Umer Saleem regarding the cardiac arrhythmias (Tr. 4/10 at 25:5-8).
- Alexia's symptoms improved dramatically within 1 week of the PECO AMI meter removal on May 24, despite nearly 6 months of unexplained symptoms. Within 1 month all symptoms including the arrhythmia had disappeared (Tr. 4/10 at 12:24-5).
- Dr. Saleem ordered a Holter monitor, however it could not be performed immediately, and by the time this test was performed, Alexia's problem had been resolved. (Tr. 4/10 at 67:16-18).
- Within weeks of AMI meter re-installation in early September Alexia developed symptoms again (Tr. 4/10 at 13:10-17).
- After the AMI meter removal on November 1, 2016, Alexia's symptoms have resolved while she is around the house (Tr. 4/10 at 15:8-9).
- Alexia wrote letters to PECO executives to see if she could have medical accommodation under the Federal Americans with Disabilities Act, but was told by PECO that there was no basis for that accommodation (Tr. 4/10 at 14:4; 15:23; 18:3).
- Alexia testified to related symptoms in association with other kinds of EMF (Tr. 4/10 at 28:17-18), however the symptoms have different timing (Tr. 4/10 at 28:24-25) and characteristics (Tr. 4/10 at 28:10).
- Alexia does have some ongoing symptoms occurring outside the house, but she has not had symptoms at the house since the AMI meter was removed and a jumper plate installed (Tr. 4/10 at 30:12-21).
- Alexia saw Dr. Rea, a specialist in Electrical Hypersensitivity Syndrome (EHS), in August 2017. (Tr. 4/10 at 27:1-3)

- Alexia does not want to volunteer for medical experimentation and requests a meter recommended by her physicians. (Tr. 4/10 at 62:14-16).
- Alexia stated concern that all the PECO accommodations have a FlexNet radio, and that all the meters with radios could be transmitted via secondary antenna effect. (Tr. 4/10 at 205:1-5)

4.2 TESTIMONY OF DR. LAWRENCE MCKNIGHT

- Dr. Lawrence McKnight is a Physician, with board certification in Internal Medicine, who works as a Hospitalist and in the field of Medical Informatics (Tr. 4/10 at 81:11; 82:4).
- Dr. L. McKnight is a complainant (Tr. 4/10 at 6:14).
- Dr. L. McKnight is Dr. Alexia McKnight's husband (Tr. 4/10 at 78:23).
- Dr. L. McKnight witnessed the dramatic change in Alexia when the AMI meter was installed (Tr. 4/10 at 83:9), improvement when the AMI meter was removed in May 2016 (Tr. 4/10 at 84:8), and worsening with re-installation in Sept 2016 (Tr. 4/10 at 84:21).
- Dr. L. McKnight was recognized as an expert as a physician, how to make diagnoses, how to interpret medical records, and how to interpret scientific research publications (Tr. 4/10 at 96:7).
- When Alexia complained of lightheadedness and palpitations, Dr. L. McKnight took Alexia's pulse and confirmed that it was irregular and bradycardic (Tr. 4/10 at 126:20-22). He then advised her to see a Cardiologist (Tr. 4/10 at 67:4-5).
- Dr. L. McKnight was initially extremely skeptical that an AMI meter was causing Alexia's symptoms or that EMF was could cause health effects initially, but later became convinced only after a long series of events living with Alexia (Tr. 4/10 at 123:16-18) including statements that established for him that Nocebo effects were not playing a role (Tr. 4/10 at 124:16-20. McKnight Exhibit 6 at page 1). This caused him to do a more thorough re-review of the medical literature on this topic (Tr. 4/10 at 125:6-7).
- Spectrum bias is a skewing in the randomization of the study. It can occur because there is a tendency for the sickest patients to not volunteer or participate. (Tr. 4/10 at 115:17-21, McKnight Exhibit 6 at page 5).
- Dr. L. McKnight testified that in his expert medical opinion, after careful review of the studies referenced or done by Dr. Rubin (McKnight Exhibits 7,8,9), those that reference such studies such as in the WHO report (McKnight Exhibit 15) and Dr. Israel's pre-filed report (PECO Exhibit MI-3) these are statistically invalid because, among other things, they did not properly account for the issue of spectrum bias. (Tr. 4/10 at 118:9; 171:13; 174:17-19).
- Dr. L. McKnight testified that in his expert medical opinion, it is beyond reasonable medical certainty that the AMI meter was causal for Alexia's symptom exacerbation (Tr. 4/10 at 128:7-17).
- Dr. L. McKnight expressed his medical concern over Alexia's safety that another smart meter may cause more harm (Tr. 4/10 at 129:9) through 3 possible mechanisms of EMF transmission which need to be mitigated in PECO's accommodation. These 3 mechanisms include 'dirty electricity' (conducted transients), Radio Frequency from the AMI's primary antenna, and a secondary antenna effect where the RF is coupled onto household wiring (Tr. 4/10 at 90:7-22; 200:1-6).
- Dr. L. McKnight clarified that in this complaint, Alexia, the patient, must make the decision to volunteer for alternative meters accommodations that are not known to work for her (Tr. 4/10 at 201: 4).

4.3 TESTIMONY OF MR. RUSSELL BROCATO.

- Mr. Brocato was the power quality technician called out to fix the McKnight's stray voltage issue. (Tr. 4/10 at 209:1-3)
- The McKnight's did not remove the PECO AMI meter (Tr. 4/10 at 212:16). Mr. Brocato was the person that pulled the AMI meter off the McKnight house on both occasions. (Tr. 4/10 at 211:22).
- There were no problems with the Meter box at the McKnight household. (Tr. 4/10 at 215:24–216:4; 225:2)

4.4 TESTIMONY OF DR. PETER PROCIUK.

- Dr. Prociuk has acted as Alexia's personal physician since roughly 2010 (Tr. 4/11 at 243:8-9)
- Dr. Prociuk is an expert in the field of medicine. (Tr. 4/11 at 247:1)
- Dr. Prociuk testified that the smart meter was injurious to Alexia' health and causal for her palpitations (Tr. 4/11 at 258:21-25.).
- Dr. Prociuk testified that a smart meter is unsafe for Alexia (Tr. 4/11 at 259:10).
- Dr. Prociuk testified that in his expert medical opinion it is beyond a reasonable degree of medical certainty an AMI meter will cause an exacerbation of Alexia's symptoms and specifically cause another cardiac arrhythmia. (Tr. 4/11 at 256:17-23)
- Dr. Prociuk testified that the health issue with respect to smart meter is entirely related to EMF. (Tr. 4/11 at 312:3-5).
- Dr. Prociuk testified that (for patients like Alexia) his concern is over all sources of EMF including reduction of harmonics (Tr. 4/11 at 312:8-11).
- Most physicians are not trained to know legal phrasing or implications and would not know how to state important legal phrases to use unless guided by a professional legal team (Tr. 4/11 at 309:4-10).

4.5 TESTIMONY OF MR. WILLIAM BATHGATE

- Mr. Bathgate is a scientific expert in the areas of electrical engineering and in the design and measurement of power systems and radio design. (Tr. 4/11 at 327:12-13; 328:14-15).
- Mr. Bathgate tested conducted emissions of 2 versions of the Aclara meter proposed by PECO to be installed at the McKnight household relative to a clean baseline (Tr. 4/11 at 342:25, Complainant Joint Exhibit 5 at page 10). He reported that both meters produced transients of over 300 millivolts. (Complainant Joint Exhibit 5 at page 3-4) which is more than 1,200 times the FCC class B specification for unintended conducted emissions of other devices like this in households. (Tr. 4/11 at 348:14-16; 354:20)
- Mr. Bathgate has tested other meters, including the Landis + Gyr, and noted that they have the same problem with extremely high conducted transients. (Tr. 4/11 at 366:2-4).
- Mr. Bathgate testified that he measured the transients at the McKnight household, and that they were not visible using the same scale 200millivolt/div scales used in Complainant Joint Exhibit 5 at page 3-4, but instead needed to change scale to 50millivolts/div see them because they were so much smaller. (Tr. 4/12 at 20:20-25; 21:1-5)
- The FlexNet radio sends bursts of information, and that burst of information is frequently interpreted as a 'pulse'. (Tr. 4/11 at 379:8-10)
- Most modern cell phones transmit at 0.4 -0.5 watts (Tr. 4/11 at 384:21-22)

- A secondary antenna is created when a primary antenna sends electromagnetic energy to another wire, and the other wire conducts the RF. This is the same antenna design principle used when attempting to design an antenna to have more power directed in a particular direction, but can happen as an unintentional effect. (Tr. 4/11 at 389:20-390:1-10)
- Mr. Bathgate testified how the antenna of the AMI meter is in close proximity to other wires within the meter box, and this can work to create a secondary antenna effect on other household wires and ground (Tr. 4/11 at 389:17-390:4).
- Mr. Bathgate testified that he has seen the secondary antenna effect specifically occur with other smart meters, and that removal of the smart meter radio makes the effect go away. (Tr. 4/11 at 391:1-3)
- Mr. Bathgate testified that simply moving the AMI meter to a pole far from the house will not prevent the secondary antenna effect (Tr. 4/11 at 400:22-25-401:1).

4.6 Testimony of Dr. William Rea

- Dr. Rea is a medical expert with specific specialty in EHS (Tr. 4/12 at 58:11-18).
- Dr. Rea has seen and examined Alexia, and acts as her specialist physician (Tr. 4/12 at 58:9-10).
- Dr. Rea has seen more than 1000 patients with EHS (Tr. 4/12 at 57:6).
- Dr. Rea has published extensively in the area of environmental medicine and EHS (Tr. 4/12 at 57:8-16).
- Dr. Rea reviewed the records of Dr. Prociuk and Dr. Saleem (Tr. 4/12 at 63-66).
- Dr. Rea performed randomized double blinded EMF provocation on Alexia where she responded only to real EMF challenges, but not to blanks (Tr. 4/12 at 60:12-14; 67:6-17).
- Dr. Rea testified that Alexia is clearly electromagnetically sensitivity (Tr. 4/12 at 68:7).
- Dr. Rea specifically considered alternative causes for Alexia's symptoms including Nocebo or psychologic origins, and ruled these out (Tr. 4/12 at 69:1-6).
- Dr. Rea testified that arrhythmia is a common finding in patients with EHS (Tr. 4/12 at 70:4-5).
- Dr. Rea testified that his 1991 study (McKnight Exhibit Number 13) was double blinded (Tr. 4/12 at 71:12-14).
- Dr. Rea testified that his 1991 study was reproduced (Tr. 4/12 at 71:19-23).
- Dr. Rea testified that Alexia's therapy includes avoidance of smart meters (Tr. 4/12 at 72:20-22).
- Dr. Rea testified that it is not uncommon for smart meters to cause problems for patients with EHS (Tr. 4/12 at 74:2-4).
- Dr. Rea testified that beyond reasonable medical certainty that the smart meter is was what caused the change in Alexia's health, and specifically was the cause for her arrhythmia. (Tr. 4/12 at 74:5-18).
- Dr. Rea testified that another smart meter would be unsafe for Alexia (Tr. 4/12 at 75:12-16).
- Dr. Rea testified that he recommended an analog meter because they have been tolerated by those with EHS, and other kinds of meters had not been tested (Tr. 4/12 at 76:6-17).
- Dr. Rea testified that EHS is different from IEI-EMF because EHS is due to EMF. It is not idiopathic (Tr. 4/12 at 96:12-15).

4.7 Testimony of Mr. Brian Uber

- Mr. Uber is a PECO employee working in Customer Field Operations (Tr. 4/12 at 112:19-20).
- Brenda Eison was in charge of the AMI Department, but has since retired (Tr. 4/12 at 114:23; 115:3).

- Only one AMI Meter (serial #127832547) used on the McKnight Residence. Serial Numbers matched between installations (PECO BU-1 at page 2, entry 11/30/2015, at page 4, entry 9/7/2016).
- Alexia called on May 2, 2016 to complain of the meter transmitting more frequently than it should be (Tr. 4/12 at 129:9-130:13).

4.8 TESTIMONY OF MR. GLENN PRICHARD

- Mr. Prichard is the manager of the Smart Grid Engineering Team and lead engineer on the AMI deployment (Tr. 4/12 at 141:18-22).
- Mr. Prichard has not worked on the commercial manufacture or design of components. (Tr. 4/12 at 144:8).
- Mr. Prichard has only hobbyist experience in components such as switch mode power supplies (Tr. 4/12 at 145:9-10).
- 40% of the AMR devices were Analog designs, although they did have a Radio (Tr. 4/12 at 149:24).
- The AMR meter transmitted at one (1) watt (Tr. 4/12 at 150:12; PECO Exhibit GP-3).
- The AMI FlexNet radio transmits at two (2) watts (Tr. 4/12 at 154:25; PECO Exhibit GP-5).
- AMR meters typically transmit less than half a mile (Tr. 4/12 at 213:15-16).
- AMI meters typically transmit 2-3 miles and sometimes further (Tr. 4/12 at 213:21-25).
- PECO's FCC Grant of Equipment authorization allows for up to 1.3213 watts for the Aclara AMI Meter, 1.2764 watts for the Stratus AMI Meter, and 1 watt for the L&G AMI Meter (PECO Exhibit GP-12).
- Mr. Prichard provided the data for Dr. Davis' calculations for the RF Fields. (Tr. 4/12 at 154:11-14)
- The AMI meters are provisioned with a tuning process where different frequency bands are tried (Tr. 4/12 at 164:9-11).
- PECO AMI meters coming from the factory are designed to transmit every 90 minutes, but PECO progressive adjusts this value until they get an 'optimal number' (Tr. 4/12 at 202:13-17).
- The AMI meters have a parameter to determine how often the meter transmits and that this parameter is set depending on how well the sent data is received. (Tr. 4/12 at 167:2-3).
- AMI meter tuning is done remotely (Tr. 4/12 at 214:21-22) and is highly automated (Tr. 4/12 at 215:11-12).
- Topography can affect RF transmissions (Tr. 4/12 at 257:15-17).
- The Stratus AMI meter became available April 2018 (Tr. 4/12 at 169:6-23) and does not have a switch mode power supply, but instead uses a capacitor pump power supply. It does have a FlexNet Radio, however (Tr. 4/12 at 169:6-23).
- The McKnight's are on their own transformer (Tr. 4/12 at 205:25).
- PECO used a Rush Track 7000 Power Quality Meter to record data and introduced this as PECO Exhibit GP-13 (Tr. 4/12 at 183:22-23).
- PECO's second accommodation – to have an Advanced Meter Service Provider read the meter -- is not viable because there is nobody in this market place (Tr. 4/12 at 197:4-5).
- PECO's third accommodation – to have the AMI installation delayed – is not viable because the deployment is complete (Tr. 4/12 at 197:21-22).
- PECO's sixth accommodation - to design the AMI system to have less radio transmission – is not an accommodation and design choice did not consider if they would decrease RF exposure to customers (Tr. 4/12 at 200:11-14).

- The AMI reporting system and PECO Workflow Management System are disconnected (Tr. 4/12 at 273:13)

4.9 Testimony of Dr. Christopher Davis

- Dr. Davis is a Physicist (Tr. 4/13 at 18-20).
- Dr. Davis does not have formal training in biology other than a course in biophysics as a graduate student (Tr. 4/13 at 17:5-11).
- Dr. Davis does believe that people with EHS or IEI-EMF have real symptoms (Tr. 4/13 at 154:5-6).
- The number shown in PECO Exhibit CD-5 and CD-6 are calculated values (Tr. 4/13 at 86:2).
- There are studies showing EEG changes at nonthermal doses using pulsed RF (Tr. 4/13 at 129:6-11).
- Other countries set RF exposure standards differently than the FCC (Tr. 4/13 at 123:3).
- Burst effects or pulsing RF behaves quite differently biologically than continuous RF (Tr. 4/13 at 130:1-5).
- Compared with continuous wave radiation, pulsed microwave fields with the same average rate of energy deposition in tissues are generally more effective in producing a biologic response (Tr. 4/13 at 145:12-17, McKnight Cross Davis Exhibit 2 at page 506, Special considerations for pulsed and amplitude modulated waveforms).

4.10 Testimony of Dr. Mark Israel

- Dr. Israel is a Pediatric Oncologist (Tr. 4/13 at 176:22).
- Dr. Israel has never see or treated patients with EHS or IEI-EMF (Tr. 4/13 at 183:5-7).
- Dr. Israel has never written any books or papers on the topics of EHS or IEI-EMF (Tr. 4/13 at 183:8-10).
- Dr. Israel does not see patients anymore (Tr. 4/13 at 229:16-17).
- Dr. Israel does believe that people with EHS have real symptoms (Tr. 4/13 at 285:24-25).
- Dr. Israel does not have any idea what he would recommend to a patient with EHS or IEI-EMF, and has not even thought about it (Tr. 4/13 at 230:14-21).
- Dr. Israel has not taken a history nor examined Alexia (Tr. 4/13 at 239:11-12).
- Dr. Israel does not know what is causing Alexia's symptoms (Tr. 4/13 at 239:4-7).
- Dr. Israel's 'medical evaluation' came from submitted medical records (Tr. 4/13 at 240:15-16), and the studies described in his exhibit (PECO Exhibit MI-3), and his background experience (Tr. 4/13 at 241:3-4).
- Dr. Israel did not ask for any further information or medical records from the McKnight's to make a more complete evaluation (Tr. 4/13 at 269:21-270:1).
- Dr. Israel testified that "It would be just totally inappropriate for me to try to make a suggestion for what [Dr. L. McKnight] should do [concerning Alexia's condition]" because he knows so little about the situation (Tr. 4/13 at 231:12-14).
- Dr. Israel testified that treatment decision are based on evaluation of the patient in the context of what is known at the time (Tr. 4/13 at 246:13-15).
- Dr. Israel has no idea what it is called when a subject does not finish a test in a research study (Tr. 4/13 at 254:2).
- In a research study it is important to know if a problem persisted from one testing period to the next (Tr. 4/13 at 263:21-23).

5 ARGUMENT SUMMARY

We have shown that Alexia has an unusual condition where she is more sensitive to EMF fields than a normal person, and that because of her unusual condition she has already been harmed by a PECO AMI meter on 2 separate occasions. The bulk of the argument below establishes this. However, in summary, three (3) separate board-certified physicians have testified to her being unusually sensitive to EMF, and that the AMI meter specifically exacerbated her symptoms and caused harm. PECO has not adequately rebutted this, and the strong 'preponderance of the evidence' in this case shows that Alexia was harmed by the AMI meter. She has had extensive evaluation, other possible medical causes for Alexia have been excluded, medical experts stated they know of similar cases like her before, current therapy of avoidance is working, and no other alternative explanations have been proposed.

Understanding that Alexia has been diagnosed with an unusual sensitivity to EMF, her physicians believe that in their expert medical opinions that the most likely mechanism for an AMI Meter to cause harm in Alexia would be some sort of EMF coming from the AMI smart meter, and advise that she needs a safer alternative. Her physicians therefore advise use of an alternative utility meter that does not have a radio or switch mode power supply. They indicate that that an old fashioned analog meter is probably safest because it emits the least amount of EMF. They have stated that it would be unsafe for her to have another kind of meter that does not have those issues addressed.

Alexia's safety is at stake. We argue that the prior harm events predict that future events will occur unless interventions are established that address the mechanisms of that harm. Without understanding and addressing mechanisms of harm, the only solutions that have been shown in the past to work would be a jumper plate with indefinite power usage estimation (which is currently working), or a simple old fashioned analog meter (which Dr. Rea has stated he has seen work in the past for similar patients). Anything else becomes a medical experiment.

Section 1501 requires accommodation to ensure safe and reasonable service, and Alexia's physicians have advised that this is a safety issue. We therefore seek relief for reasonable accommodation and sanctuary to accommodate Alexia's medical safety.

The accommodations that PECO offers to date are insufficient because they do not fully address the fundamental mechanistic issues of EMF as understood by her physicians, nor do they fully address all the issues of how an AMI meter could generate EMF as identified by Mr. Bathgate.

While it is clear that the AMI meter is the proximal cause if nothing else because of the strong temporal association, Alexia's known sensitivity is to EMF in general, and the AMI Meters capacity to generate EMF in general, it is unclear exactly which mechanisms transfer the EMF from an AMI meter to Alexia's body because an AMI meter has several mechanisms to do this and all may be playing roles in part.

Mr. Bathgate has identified at least 3 ways by which an AMI meter can generate EMF, including:

1) Intentional RF from the FlexNet radio antenna;
2) Unintentional conducted emissions of voltage transients because of the faulty switch mode power supply without proper filter design or grounding;
3) A secondary antenna effect where the FlexNet radio antenna unintentionally transmits its RF via house hold wiring which could decrease the proximity between Alexia and the source of RF.

The McKnight's have already taken other steps to eliminate most sources EMF for her and give Alexia a sanctuary at her home, and this is working while the jumper plate is installed. Mr. Bathgate did an evaluation and testified that indeed voltage transients ('dirty electricity') at their household are now very low, and that smart meters he tested including the Aclera model PECO offers have significantly higher levels of voltage transients than measured at their household. Mr. Bathgate testified that the reason for this is that many of the AMI meters have high voltage transients is because they have a switch mode power supply which does not have appropriate filtering. Additionally, Mr. Bathgate noted that the FlexNet radios that are in the AMI meters appear to sometime transmit far more frequently than expected by design. Finally, he explained how it is possible to transmit the RF from the FlexNet radio over to household wiring as a secondary antenna effect.

In theory, simultaneously addressing all 3 transfer mechanisms should address the safety concern since no other mechanisms have been suggested. However, to try alternatives to the known methods would still necessarily form a kind of human medical experiment on Alexia to see if a 3rd AMI meter installation would cause harm again, or not. Performing such an experiment on a person, (especially a who has been harmed already on 2 occasions) is unethical, unless that person has been asked and gives consent. Alexia has not volunteered to participate with so many open issues that may cause her harm again.

In the alternative where the operating mechanism is considered truly unknown (something other than the 3 mechanisms above), but the proximal cause is still the AMI meter, the only reasonable safe option for Alexia is indefinite use of a jumper plate and ongoing estimation until operating mechanism clarity can be achieved, or to try an old fashioned analog meter without a radio or switch mode power supply on grounds that Dr. Rea has seen this work for similar patients in the past.

We do understand that Act 129 has been interpreted in the past to not allow for any exceptions. However, we argue that Section 1501 predates Act 129, there is no verbiage in Act 129 stating that that it supersedes, replaces or overrides section 1501 provisions, and it is inherently reasonable to consider that solutions be medically safe for customers even while they might have unusual circumstances. And there is nothing in Act 129 that indicates that Section 1501 can be ignored.

Also, we do not see that Act 129 asks specifically for radios or switch mode power supplies at all, anyway. Nowhere in the definition of smart meters does it mention these 2 things. Thus, the choice to use the specific AMI meters that PECO offers appears to be an implementation decision to use the FlexNet radio and devices with switch mode power supplies which is not required by law. For example, alternative communication techniques such as fiber optics seem to be clearly allowed, and PECO recently added option to use the Sensus Stratus meter which does not use a switch mode power supply.

We do greatly appreciate that steps PECO took to include the Sensus Stratus, and see it as the first step in the right direction to address our safety concern. We would like to see more verification that indeed that solved the voltage transient issue identified by Mr. Bathgate, but in theory this meter should have much better characteristics for patients like Alexia.

The major remaining problem with this accommodation is that the Stratus meter still contains the FlexNet radio, and that a physical move of the meter box (among other problems) does not address the problems related to secondary antenna effects. Alexia has indicated that she does not want to volunteer for this trial.

However, if a metering solution could be found that has both a capacitor pump power supply with measured low transients near FCC class B specifications, and included an alternative communication method (e.g. fiber

optic), or any way that better addresses a method of communication without a radio, then the safety concern could be addressed without interference to the wording of Act 129. If such as device or solution can be found and an experiment could be established that follows ethical guidelines then Alexia would consider this trial.

6 ARGUMENT

6.1 BURDENS OF PROOF

6.1.1 Commentary

In negotiation of an acceptable alignment in the table of content for this document, PECO felt it important to ensure that there was an argument section about 'Burdens of Proof.'

As non-legal pro-se representation we feel out of our league to argue how the legal system works or should sets burdens of proof. Further, this issue has been discussed in prior similar cases as discussed below.

As briefly touched on in the Dr. L. McKnight's testimony (Tr. 4/10 at 123:2-6), Independent of this proceeding, health safety concerns do not typically require this level of proof or seem to have the same meaning of 'burden' as in a legal sense. And so, as pro-se non-lawyers, we find this situation of being required to establish legal proof of harm to establish safety a bizarre and foreign concept.

In a culture of safety, precautions are typically taken when there is reasonable concern that an event *MIGHT* happen. And where human harm might be occurring there would generally be a conservative approach to avoid that harm even if there was a small chance. Rarely, if ever, would a culture of safety require proof of harm event before actions are taken. Instead, there are considerations like risk of event, severity of event and risk of missed event detection. In Alexia's case the risk is high because it has happened 2 times, and the severity is relatively high because it causes a prolonged misery, and the independent detectability prior to events is low because PECO has minimal infrastructure to track or log transmission malfunction. This framework of event risk is intuitively obvious because by the time harm occurs, it is too late to be safe. To establish safety, it is not possible to wait and prove things. However, in this case it feels like we must apparently prove harm occurred *before* a safety concern can be considered. To us, this seems like asking a person to prove that the fire occurred *before* allowing that person to purchase a fire extinguisher.

Nonetheless, because there has been ruling on the issue previously that it is the complainants must show by a 'preponderance of evidence,' we assume that this is the judge's realm to decide that that's what she decided in the past. So, we have attempted to show in this legal proceeding that by a 'preponderance of evidence' that the AMI meter did cause harm and adverse health consequences in Alexia (because it did just happen to do that). From this we argue that she still needs appropriate safety accommodation to prevent another occurrence.

We do agree with PECO, however, that there may be important considerations in the discussion of the legal framework that may become relevant considerations as the ALJ is weighing evidence.

This case may raise important questions about the role of a medical and scientific experts, how these experts may have formulated their opinions, and may agree or have debate, and when some issue in science or medicine may be considered 'acceptable', 'consensus' or may become a 'medical basis.' These seem like deep philosophic arguments, and we suspect that there is extensive legal discussion about this somewhere. But, there may be potential for a secondary question and confusion for us to somehow show a legal burden that the

medical or science experts have secondarily established that a "preponderance of all scientists" or medical experts in the world somehow agree, as opposed to have formulated their conclusions and opinions based on some different level of a 'reasonable person or scientist or physician would accept'.

For example, PECO has previously used an argument that a letter of *Woodbourne-Heaton* "thus provides a dispositive framework for the burden and standard of proof in the instant proceeding: If the Complainants prove that there is a body of conflicting and inconclusive science, or that the science is "undecided," then the Complainants have failed to meet their burden of proof, and cannot prevail." (Docket C-2016-2537666, Randall/Albrecht v PECO, Main Brief of PECO Energy Company at 18:3-6).

We consider this line of argumentation complete non-sense and completely inappropriate!

In a short legal hearing there is inadequate time to describe the complexity and controversy of this syndrome, how the medical and scientific communities understand it, or agrees or degrees to which they believe it to be 'established science'. It is fair to say that there is a medical and scientific controversy with strong opinions on both sides. However, it is not the job of the legal system to resolve these issues or establish when science or medical techniques in general have become 'established' using the same legal standard of 'preponderance of evidence'. Instead, we interpret 'Preponderance of evidence' to mean with respect to the facts in this case, not to the facts of science or medicine in general.

First, there is really no such thing as a 'medical consensus' - for *any* disease. Similarly, rarely, if ever, is there any point in science where there is NOT some degree of reasonable conflict. This is in large part our understanding of science and medicine is constantly being updated, and so any 'medical consensus' that could ever be measured is constantly shifting. Also, there is no way to determine when, or even if consensus has formally been reached or the science is 'decided'. It's hard enough to get agreement on where the boundary of a disease even is. So, as the Carl Sagan quote (in McKnight Exhibit 6, page 10) states "…in science there are no authorities; at most, there are experts." While there clearly is some medical controversy over EHS, when or how it should be 'diagnosed', when it might be caused by EMF, or might be caused by a nocebo effect, there can never be any distinct line at which such controversies could have crossed the line to become a 'medical consensus,' 'settled', or 'established'.

This situation will always yield medical and scientific experts that have differing viewpoints or expert opinions. It's hard to understand how the law would ever be able to determine if some medical issue here was a 'medical consensus' in general or not except to listen to the medical experts discuss the facts of a particular case and conclude 'sounds plausible / reasonable' or 'I'm not buying it'. But, that judgement would not represent a real 'consensus' point or factual 'preponderance of the evidence' line much less a much higher bar of 'established' line for the entire subject in the scientific communities. In a single court case only a tiny fraction of the general opinion or truth on the subject has been discussed.

In our view, this issue of medical controversy is why there may be value to review the issues in the Richardson case (discussed below) where the bar was set in federal disability cases to be 'substantial evidence' or 'what a reasonable mind might accept as adequate to support a conclusion.'

To use PECOs *Woodbourne-Heaton* argument as the 'dispositive framework' would mean that it is essentially impossible for any complainant to ever win. All the defendant would have to do is show the science still had some unanswered questions or that a single person disagreed to create a controversy. Even then, the

defendant could create the 'uncertainty' by simply question, "show me the research" for questions that are unethical or irrelevant to study in science.

Second, there can be some confusion over what a 'diagnosis' is, and how it relates to diagnostic criteria. For example, Dr. Israel states that there when there are no recognized diagnostic criteria, you can't reliably make the diagnosis (Tr. 4/13 at 228:23-24). Sort of. This is really only true in the context of research. A medical 'diagnosis' is only a label. In research this label is important because the diagnostic criteria to establish the label are used to ensure that the patients can reliably align similar pathology on that diagnostic label and it can be more clear when or if the results of the study should apply.

However, in clinical medicine the focus is not to compare the patient to a similar patient and see if 2 patients react the same. It is instead to *treat* the patient, or to apply the results of some scientific study. In this clinical medicine there is more of a grey zone because the patient can be matched based on an informal similarity rather than an exact match to a formal label and specific diagnostic criteria. The purpose is only to match a reasonable therapy so if its 'close/similar' the study still can apply, and conversely if there is some other reason to not to apply the study (e.g. patient has an allergy to the study drug, or the patient is on hospice). The clinician may choose not to apply the results even though the labels match because it may be the most reasonable thing to do given uncertainty in the science or how it relates to the unique circumstances of the patient (e.g. a study that included patients less than 80, but the patient in question was 81, or a study that was done in a similar disease but the patient has 8 of 10 findings and no better alternatives). This principle of research criteria as opposed to clinical use has been well established in Rheumatologic diagnoses, for example, where patients often present with a range of complex overlapping syndromes (e.g. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4482786/). In fact, that is how Dr. Israel is able to make the statement 'That claim is consistent with…' (Tr. 4/13 at 201:14-17) and make any statement about what he things could or could not be causing things. 'Consistent with' is the correct wording if called a 'syndrome' or 'diagnosis' or 'problem' or 'condition.' The purpose in clinical medicine is to use the that 'consistent with' to do something reasonable. A study may be applied in uncertainty or inexact match because case similarity makes it reasonable to conclude the results of the still apply. This is where the 'art of medicine' applies, why there is often disagreement between physicians, and why it is generally felt that superficial review medical records do not substitute for taking a through history and doing a good physical examination. Dr. Prociuk testified to this (Tr. 4/11 at 258:16-18) and even Dr. Israel agrees (Tr. 4/13 at 267:23-268:6).

In research however, this inexact definition makes it hard to compare studies because everyone has a slightly different view of who is or isn't included in this thing we label as a disease (e.g. 'EHS' or 'IEI-EMF'). A 'systematic review' like Dr. Rubin's 2010 article (McKnight Exhibit 9) is therefore questionable because it isn't clear which of the cited studies should or should not be included in any analysis of the general topic – if the patients were 'similar enough,' or if it is inappropriately mixing disparate groups. Applying such a study leads to a problem of assigning similarity and determining to what the patient is being compared to? This is where and why diagnostic criteria become important. For example, Dr. Rea's study would not define EHS to include every patient stating, 'I am sensitive to my cell phone', but instead only the smaller fraction that have undergone appropriate screening to show sensitivity (e.g. the 16% that made it to phase IV) and have had psychologic issues ruled out. On the other hand, most of the studies cited by Dr. Israel tend to define the topic more broadly to be roughly anybody who states, 'I am sensitive to EMF.' This dramatically affects the pool of patients that are involved in studies, and fuels the flame of the controversy over cause because it confuses subpopulations that may require different therapy.

Third, while there is still much to be learned about this syndrome of EHS, the medical literature does include numerous studies that do show not only existence of this syndrome (which even Dr. Israel and Davis admit – 'the symptoms are real'), but also that the etiology is specifically either from some form of EMF or from some variant of a Nocebo effect. No other etiologic mechanisms have been seriously proposed, and the debate on those 2 etiologies would be specifically to determine what might *help* these patients. So, if a Nocebo, then the appropriate therapy choices should be different of CBT (McKnight Exhibit 6 at page 1). The debate is not intended to be a reason to exclude someone from treatment, or exclude a physician from making a rational decision to advise avoidance of EMF. The purpose of the debate is to decide what works better, or what will help the patient. Should the recommendation be to see a psychiatrist and fix the thought disorder, or is it to fix the source of EMF.

In Alexia's case recommendation to see a psychiatrist has NOT been suggested to be of benefit. That disease pathway was ruled out. But further, this case proceeding has generated a situation where it is blocking 2 treating physicians from suggesting what they strongly feel to be the appropriate alternative – to avoid the EMF.

Both Dr. Davis (Tr. 4/13 at 154:5-6) and Dr. Isreal (Tr. 4/13 at 285:24-25) admitted that patients with EHS or IEI-EMF have real symptoms. In our view, it may be ok to tell a patient "sorry, we have nothing to offer you, no we don't think psychologic help will work, no we don't think its EMF either, and we really don't know what is". But, to go one step further and have PECO use this to say "No, sorry. We understand you do have real symptoms, and have no solutions for you, but your doctors CANNOT advise or recommend EMF avoidance because, well that would interfere with our business plan" – we feel that is unethical!

And, beyond the few studies mentioned explicitly by Dr's McKnight, Prociuk, and Rea, there is also much other literature not mentioned explicitly in this proceeding showing that EMF can be a cause of EHS, and that EMF can cause biologic effects at levels much lower than the FCC limits. There is simply no way to bring all this to bear in a 4-day hearing.

Dr. Israel is correct that all studies tend to have some issues, and there is good and bad literature on both sides of this debate. However, in the more general debate of EMF effects there are several thousands of studies. There is significant literature clarifying further how the biology is believed to work all the way down to molecular levels. Even if not admitted in this case, it should be self-evident that such literature does exist, and that such ongoing research does exist and would not exist or be funded if there was consensus that biologic effects from low dose ('non-thermal') EMF are impossible and that safety is an easily computable value, as for example Dr. Davis tends to argue. In other words, there is simply no consensus that EHS <u>cannot</u> be caused by EMF, or that science has officially established that EMF cannot cause biologic effects at non-thermal doses much lower than the FCC limits are set, or that EHS is not really caused by EMF.

And, in Alexia we find a case where it apparently can and does.

Forth, and perhaps most important is that the role and obligation of the physician to diagnose and treat a patient does not change when or if there is scientific uncertainty. As mentioned, in medicine there is nearly always some degree of scientific uncertainty. Not just in the literature itself, but also how it relates to unique patients. Each patient is different, so it is the complex job of the physician to match the patient's symptoms of the patient to the most appropriate explanations and therapy in a context of their other medical problems. Physicians do this, and need to do this regularly even when the understanding of science is unclear, shifting, or controversial.

Even Dr. Israel testified that treatment decision are based on evaluation of the patient in the context of what is known at the time. (Tr. 4/13 at 246:13-15), and even Dr. Davis admits that people have important biologic differences, so that, for example, peanuts would not be safe for a person with peanut allergy. (Tr. 4/13 at 114:1-2). Even Dr. Israel testified that treatment decisions are based on evaluation of the patient in the context of what is known at the time. (Tr. 4/13 at 246:13-15) and that "It would be just totally inappropriate for me to try to make a suggestion for what [Dr. L. McKnight] should do [concerning Alexia's condition]" because he knows so little about our situation. (Tr. 4/13 at 231:12-14).

The fact that science does not have full understanding of a disease does not imply that patients do not seek treatment, or that physicians are less required to do the best they can to navigate the uncertainties and make reasonable suggestions that are consistent with the scientific understanding. Even Dr. Israel admits – at one point in time patients with HIV/AIDS did exist (Tr. 4/13 at 284:11-17), even while the science did not understand how it could occur. It was physicians working in a state of uncertainty that helped these patients, and worked to better understand the disease. They did this before the disease had a label or pathologic mechanisms described, and they used the experience to morph the disease labels and describe the pathologic mechanisms. There was controversy the whole way.

In periods where the science is early or difficult, there is strong reluctance to state a hypothesis as true while it has even a small degree of uncertainty. Science works in a general sense and does not want to add a false basis. But physicians work with individuals that need help even while the scientists are still arguing over the details.

Therefore, while waiting for some 'medical consensus' to occur (however that might be established) history is full of stark failures where institutions did not provide protective measures, and in that period of delay people -- real people -- are hurt and suffer. Such is the case, for example, of Tobacco (McKnight Exhibit 11). Waiting for the authorities to act and provide adequate safeguards before taking actions has been shown in general to be a very poor way to establish safety.

The key to a physician's evaluation in cases of uncertainty is to be consistent with the current scientific understanding. Not full knowledge of what is known, not waiting until everything is known, to be consistent with what is currently known. In the case of uncertainty and controversy, the treating physician needs to decide as best they can and try to make rational judgements. In settings like this we must trust that physicians can examine patients, bind the scientific evidence as best they can, and make reasonable recommendations. This is inclusive of the patient's unique history and biology, along with the physicians understanding of the biology and science, and with understanding they are appropriately trained to diagnose and make reasonable medical recommendations about it.

On the other side, a utility company, or even a utility commission is in very poor position to make such determinations because they do not have capacity to do this close examination of patients, and they do not have the medical expertise to understand the complexities in the scientific literature.

So, in our view, this argument should not even be occurring in this forum. The fact that 2 board certified treating physicians are making reasonable requests is not something that a utility company should have the right to overrule. The fact that they do this by having some outside physician that has no experience in the area and has never even examined the patient testify is frankly outrageous.

6.1.2 The PUC has authority to set reasonable legal burdens of proof and has previously ruled on this issue.

In similar cases, the PUC has held that with respect to smart meter matters, "[t]he ALJ's role in the proceedings 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 will constitute unsafe or unreasonable service in violation of Section 1501 under the circumstances in this case." Kreider v. PECO Energy Company, Docket No. P-2015-2495064 (Opinion and Order, January 28, 2016) at 23. While the Commission also stated that a complainant "may" be required to present evidence in the form of medical documentation and/or expert testimony, such evidence is not the sole means. As the Commonwealth Court has recognized, a customer may establish a prima facie case with circumstantial evidence. See Milkie v. Pa. Pub. Util. Comm'n, 768 A.2d 1217 (Pa. Cmwlth. 2001)(emphasis added).

'Sufficient evidence' here not defined, however other references have been given.

In prior rulings the PUC has also stated clearly that any decision of the Commission must be supported by 'substantial evidence.' See, e.g., Section 704 of the Administrative Agency Law, 2 Pa.C.S. § 704.

In prior cases the PUC has also set the burden of proof as 'a preponderance of the evidence,' and has quoted Samuel J. Lansberry, Inc. v. Pa. Pub. Util. Comm'n, 578 A.2d 600 (Pa. Cmwlth. 1990), alloc. den., 602 A.2d 863 (Pa. 1992). For example, this was established in Romeo v. Pa. PUC, 154 A.3d 422, 430 (2017).

The distinction between a burden to show 'Preponderance of the evidence' could be interpreted as a higher legal standard than 'substantial evidence,' and this case is argued in Lansberry. Lansberry was a relatively different situation than this case however, not involving safety, nor involving conflicting medical or scientific opinions. It appears to the pro-se eyes as if this reason for this citation is that it clarified that this distinction is made because the ALJ is fact finding, or that simply that the PUC has authority to determine an appropriate burden.

As pro se litigants, we would not even really understand where and how 'Substantial evidence' is used and applied without looking it up, so we did that. We find that it has also been defined as

> *"more than a mere scintilla. It means such relevant evidence as a reasonable mind might accept as adequate to support a conclusion." (Richardson v. Perales, 402 U.S. 389, 401).*

The definition from Richardson would seem to be most reasonable and applicable to clarify issues in our case not because it so different from the Commissions quote above, but instead because it was the relevant US Supreme Court case that discussed specifically the use of physician medical examinations in the case of a disability claimant and this case discusses the issues of medical controversy.

Quoting the US Supreme Court in Richardson

> *"We therefore are presented with the not uncommon situation of conflicting medical evidence. The trier of fact has the duty to resolve that conflict. …"(at 399, section II)*

In this duty, there may not always be a simple equation to determine if a fact holds or not, or when they might be considered hearsay. Judgment may be applied on weight and relevancy, inclusive of the completeness of a body of evidence, and sufficiency of proof. In our view this would be where the interpretation of 'substantial evidence' plays a role. We argue that the ALJ is not weighing or establishing that all the facts in science and medicine are validated to a standard such as 'preponderance of scientific evidence in general', but instead is

including science and medical facts in our case where there is 'substantial evidence', and weighing the facts in our case to a 'preponderance of evidence of added facts as presented in this case.'

For example, we argue that the inclusion of some fact such as a medical evaluation of Alexia is based on what a 'reasonable mind might accept as adequate to support' or 'more than a mere scintilla', and is to specifically be contrasted specifically to some other standard such as 'scientifically proven', 'conclusively shown', 'medical consensus', or even 'diagnostically proven.' Again, to assume the later (that some scientific or medical consensus occurred, or was proven) would be problematic because there is no way for the ALJ to reasonably decide when or if these medical or scientific thresholds have occurred in the general sense based on the limited presentation of evidence in a limited court proceeding. Similarly, in the individual sense the ALJ must rely on expert testimony of physicians and establish that it is not hearsay.

Also, of interesting note, prior to the Supreme Court decision in Richardson, the District Court stated that it

> *"the opinion of a doctor who had never examined the claimant is entitled to little or no probative value, especially when opposed by substantial evidence including the oral testimony of an examining physician; and that what was before the court amounted to hearsay upon hearsay…" Perales v. Secretary, 288 F.Supp. 313 (WD Tex.1968).*

The appeal of the Fifth Circuit further held that the hearsay evidence in the case was admissible and that the written reports of the physicians were admissible in the administrative hearing; that Dr. Leavitt's testimony (a reviewing physician) also was admissible; but that all this evidence together did not constitute substantial evidence when it was objected to and when it was contradicted by evidence from the only live witnesses. Cohen v. Perales, 412 F.2d 44 (1969).

So, if true that the Supreme Court interpretation of this issue in that Richardson v. Perales does not hold, and that the principle of 'substantial evidence' threshold does not apply specifically to situations of conflicting medical evidence, then this would also seem to imply that Dr. Israel's entire testimony would be considered hearsay since he did not examine Alexia and instead only relied on some of her medical records. However, if this Supreme Court interpretation does hold then it suggests the ALJ is allowed to also make determinations of 'substantial evidence' when accepting rational testimony opinions of Dr. L. McKnight and Dr. Prociuk and Dr. Rea in disagreement with Dr. Israel, and even without Dr. Prociuk or Dr. Rea even without establishing that all of the science is 'settled'. It would imply that the ALJ can use 'informal' methods to settle a dispute over what is a 'reasonable' scientific or medical interpretation to determine if the complainants have reached a fact to include.

Instead, the Supreme Court writes:

> *"There emerges an emphasis upon the informal, rather than the formal. This, we think, is as it should be, for this administrative procedure, and these hearings, should be understandable to the layman claimant, should not necessarily be stiff and comfortable only for the trained attorney, and should be liberal and not strict in tone and operation. This is the obvious intent … so long as the procedures are fundamentally fair. With this background and this atmosphere in mind, we turn to the statutory standard of "substantial evidence" prescribed by § 205(g). The Court has considered this very concept in other, yet similar, contexts. The National Labor Relations Act, § 10(e), in its original form, provided that the NLRB's findings of fact "if supported by evidence, shall be conclusive." 49 Stat. 454. The Court said this meant "supported by substantial evidence," and that this was "more than a mere scintilla. It means such relevant*

evidence as a reasonable mind might accept as adequate to support a conclusion." (at page 400-401)

With this, we conclude that while we need to show 'preponderance of evidence' of harm in Alexia, we may do so by using the opinions of treating physicians that have made opinions and recommendations. These physicians can and must use whatever evidence they have, even while there may be some uncertainty in it. Because of this, they may be held to the standard that they used 'substantial evidence' in the process, but do not need to secondarily prove that the science they used has no uncertainty or that there has been a 'preponderance of scientific evidence' in general.

6.2 HEALTH TESTIMONY

6.2.1 Alexia was harmed in the periods where a PECO AMI meter was installed.

Alexia has testified to several symptoms that only occurred or that were significantly exacerbated during the periods when the AMI meter was installed.

Beginning on November 30, Alexia developed a wide range of symptoms including headaches of various flavors and timings (Tr. 4/10 at 28:11-29:11), severe insomnia, depression, memory problems, and a sense of not 'being able to be in my own house' (Tr. 4/10 at 10:2-15). Alexia testified to the severity of the insomnia, causing her to sleep outside in the family's sailboat in the cold of winter.

This was a dramatic change onset with the installation of the AMI meter and noticed by her husband as bizarre behavior for her (Tr. 4/10 at 83:9).

Because of Alexia's problems, the McKnight's hired an EMF consultant, Mr. Sal LaDuca in March of 2016 (Tr. 4/10 at 20:9). Mr. LaDuca identified a stray voltage issue (Tr. 4/10 at 20:9), which PECO needed to fix. PECO's investigation into the Stray voltage investigation led to the AMI Meter removal and replacement with a jumper plate on May 24, 2016 (Tr. 4/10 at 8:15-17). The stray voltage issue also led to the reinstallation of the AMI Meter on or about September 9, 2016, then removal and replacement with a jumper plate again on (Tr. 4/10 at 9:24) November 01, 2016. (McKnight Exhibit 5, PECO Cross McKnight Exhibit 2) PECO confirms these dates (Tr. 4/10 at 237:15-16), and that PECO technicians did this work (Tr. 4/11 at 237:13-18).

Mr. Brocato was the power quality technician called out to fix the McKnight's stray voltage issue. (Tr. 4/10 at 209:1-3). Mr. Brocato testified that there were no problems with the Meter box at the McKnight household. (Tr. 4/10 at 215:24–216:4; 225:2), and that he was the person that pulled the AMI meter and replaced it with a jumper plate (Tr. 4/10 at 211:22; 212:16)

In part because of Mr. LaDuca's suggestions, the McKnight's have taken several steps to reduce 'dirty electricity', and other sources of RF in their home such as (but not limited to) turning off replacing dimmer switches with regular throw switches, avoidance of all cell phone use in the house, and using hard-wired computers rather than wifi. (Tr. 4/10 at 19:23; 85:13-17). The McKnight's have also fixed internal wiring errors (Tr. 4/10 at 20:2-3).

Alexia's insomnia was significantly improved on March 20 by turning off circuit breakers to the upstairs circuits (Tr. 4/10 at 20:5-7). The AMI meter was on the house at the time, however the problem was fixed with shutting off of the power suggesting that the effect may be operating in part via conducted transients (Tr. 4/11 at

348:14-16; 354:20) or RF conducted via a secondary antenna effect on household wiring rather directly from the AMI meters primary antenna (Tr. 4/11 at 389:17-390:4).

Alexia's other symptoms persisted until the AMI meter was removed (Tr. 4/10 at 21:4-6).

Mr. LaDuca came back on another occasion (Tr. 4/10 at 141:22) and measured the number of RF transmissions coming from AMI meter, and found them to be more frequent than would be expected. On 05/02/2016 Alexia reported to PECO that the AMI meter may also be operating out of specification.

Over the course of AMI meter installation Alexia developed cardiac palpitations and lightheadedness (Tr. 4/10 at 12:7). Beyond symptoms of palpitations, she took her own pulse and verified that the pulse was erratic (Tr. 4/10 at 71:12-16), which is indicative that a new cardiac arrhythmia occurred. Alexia testified that she never had these symptoms prior to the AMI meter installation. (Tr. 4/10 at 12:11-13)

Dr. L. McKnight took Alexia's pulse and confirmed that it was irregular and bradycardic (Tr. 4/10 at 12:15-16; 126:20-22). He then advised her to see a Cardiologist (Tr. 4/10 at 67:4-5)

Alexia saw a cardiologist, Dr. Umer Saleem first on 5/23/2016 regarding the cardiac arrhythmias (Tr. 4/10 at 25:5-8). Dr. Saleem performed An EKG on the initial evaluation, however, although she was having symptoms that day, the EKG was performed during a 6 second period when she was not having symptoms (Tr. 4/10 at 70:18-24.).

PECO removed the meter as part of the stray voltage investigation the very next day, on May 24. (Tr. 4/10 at 211:22)

Alexia's symptoms improved dramatically within 1 week of the PECO AMI meter removal on May 24, and within 1 month all symptoms including the arrhythmia disappeared (Tr. 4/10 at 12:24-5).

Alexia's husband, Dr. L. McKnight also noticed her improvement when the AMI meter was removed in May 2016 (Tr. 4/10 at 84:8)

Dr. Saleem did an extensive workup including an echocardiogram and a Holter monitor. However, these could not be performed immediately, and by the time the Holter monitor test was performed, Alexia's problem had been resolved. (Tr. 4/10 at 67:16-18). Dr. Saleem saw her in follow up on June 20 and along with a normal exam writes

> *"PECO has removed the wireless electric meter at this time which correlated with a significant improvement in symptoms and complete resolution of palpitations, lightheadedness, and back pain over a period of 3-4 weeks' time. I appreciate the decision of PECO to remove the wireless meter from her property." (PECO Cross McKnight Exhibit 1 at page 3-4)*

Alexia's symptoms returned in association with the AMI meter re-installation on or about September 09, 2016. Alexia testified that the symptoms began before she even knew that the AMI meter had been re-installed. It was because of the symptom similarity from the first AMI installation that she was prompted to look for a re-installation, and found that it indeed had been installed. She found the meter on 9/21/2016 (Tr. 4/10 at 13:10-25; 53:12).

Dr. L. McKnight, her husband noted the worsening with AMI meter re-installation in Sept 2016 (Tr. 4/10 at 84:21).

Mr. Brocato pulled the meter again on November 1, 2016, at Alexia's request (Tr. 4/10 at 14:9-11; 211:22).

After the AMI meter removal on November 1, 2016, Alexia's symptoms have resolved while she is around the house (Tr. 4/10 at 15:8-9).

Over the course of 1 year since the meter has been off, Alexia has not had return of the cardiac symptoms. She admits having other symptoms when she leaves the house but has a sanctuary while at her home as long as the AMI meter has been off the house. (Tr. 4/10 at 30:16-23)

Alexia wrote letters to PECO executives to see if she could have medical accommodation under the Federal Americans with Disabilities Act, but was told by PECO that there was no basis for that accommodation (Tr. 4/10 at 14:4; 15:23; 18:3).

Alexia testified to related symptoms in association with other kinds of EMF (Tr. 4/10 at 28:17-18), however the symptoms have different timing (Tr. 4/10 at 28:24-25) and characteristics (Tr. 4/10 at 28:10).

Alexia does have some ongoing symptoms occurring outside the house, but has not had symptoms at the house since the AMI meter was removed and a jumper plate installed (Tr. 4/10 at 30:12-21)

Alexia saw Dr. Rea, a specialist in Electrical Hypersensitivity Syndrome (EHS) in August 2017.

Alexia does not want to volunteer for medical experimentation and requests a meter recommended by her physicians. (Tr. 4/10 at 62:14-16).

Alexia stated concern that all the PECO accommodations have a FlexNet radio, and that all the meters with radios could be transmitted via coupled antenna effect. (Tr. 4/10 at 205:1-5)

Alexia testified "I don't exactly want to sign myself up for any more medical experimentation. I want to go with what my physicians recommend as a safe meter." (Tr. 4/10 at 62:14-16)

Alexia's testimony of her symptoms is credible and her character was never challenged.

Alexia's testimony is corroborated by the testimony of Dr. L. McKnight.

The timing of events is unchallenged (PECO Cross McKnight Exhibit 2).

6.2.2 The PECO AMI meter caused the harm in Alexia.

The temporal association of Alexia's symptoms with the AMI meter is obvious and very hard to explain as a simple random chance occurrence. Alexia symptoms were markedly worse beginning the day of installation (Tr. 4/10 at 9:24). The symptoms were severe and noticed and witnessed by her husband (Tr. 4/10 at 83, l.9). They caused unusual behavior including sleeping outside in the middle of the winter just to be outside the house (Tr. 4/10 at 10:9-11). They persisted for the entire period of installation (months) and included new and unexplainable symptoms such as the onset of severe heart irregularity in association with bradycardia and associated lightheadedness (Tr. 4/10 at 12:6-7). The insomnia improved by shutting off electrical circuits (Tr. 4/10 at 20:5-7), and remaining symptoms including the heart irregularity improved dramatically within 1 week of the AMI meter removal and were gone with a month (Tr. 4/10 at 12:24-5). The symptoms returned within 1-2 weeks of re-installation of the AMI meter (Tr. 4/10 at 13:10-17), were witnessed by her husband (Tr. 4/10 at 84:21), persisted again for months of that second installation, then improved with the second removal of the AMI meter and have not recurred around the house for the year without the AMI meter (Tr. 4/10 at 15:8-9), although she does get them when she leaves the house (Tr. 4/10 at 30:12-15).

Further, there has been no other evidence presented on either side to suggest ANY alternative cause for the Alexia's symptoms. A strong 'preponderance of evidence' suggests that the AMI meter is 'but for causal' in this case because, quite simply, there is no evidence of any alternative even suggested. There is no balancing alternative choice. No reasonable alternative explanations for Alexia's symptoms have been postulated – not by Alexia's physicians and specialists, but also not even by PECO and their experts. All other reasonable medical explanations have been excluded. The only thing left is the AMI meter.

Further, there are very strong reasons to believe that the AMI meter was causal because it emits various forms electromagnetic field (EMF), and Alexia has demonstrated in testing that she is unusually sensitive to various forms of EMF for some reason.

Alexia does NOT just have IEI-EMF as an idiopathic etiology, or as explained by a psychologic problem caused by a nocebo effect. She has a documented sensitivity to electromagnetic fields. Her biology is not the same as a normal person. As an analogy a person with a peanut allergy has different biology from somebody that can tolerate peanuts. The tolerated dose of peanuts between a person with and without an allergy cannot be compared. The disease interferes with the definition of normal 'safe' doses and normal dosing does not apply. And more severe disease tends toward more extreme change in the tolerable dosing. Some patients with peanut allergies can tolerate if a utensil was used that touched peanut butter or might only get a minor rash. Other patients may not be able to tolerate even such minute doses without major swelling and airway compromise.

Alexia has been evaluated by Dr. Rea (Tr. 4/12 at 58:9-10), a well-respected physician that has specialty expertise in this area, has seen more than 1000 patients with this syndrome (Tr. 4/12 at 57:6), and has published extensively in the area (Tr. 4/12 at 57:8-16). Alexia was explicitly evaluated for alternative etiologies such as a nocebo or psychologic effect. Dr. Rea testified that those explanations have been definitively ruled out (Tr. 4/12 at 69:1-6). She has undergone blinded provocation studies to show the unusual sensitivity to EMF (Tr. 4/12 at 60:12-14; 67:6-17). The McKnight's have taken several precautions to eliminate other sources of EMF around their house (Tr. 4/10 at 19:23; 85:14-17).

Multiple other physicians also have examined her case and all physicians in the case find that Alexia is otherwise healthy, and find no other reason why she would have had the symptoms she experienced while the AMI meter was on the house.

6.2.2.1 Dr. Lawrence McKnight testified to harm and causality

Dr. Lawrence McKnight, her husband, is also a board certified and licensed physician, was qualified as a medical expert in this case. (Tr. 4/10 at 81:11; 82:4)

Dr. Lawrence McKnight, noticed the dramatic change in Alexia when the AMI meter was installed (Tr. 4/10 at 83:9), improvement when the AMI meter was removed in May 2016 (Tr. 4/10 at 84:8), and worsening with re-installation in Sept 2016 (Tr. 4/10 at 84:21).

When Alexia complained of lightheadedness and palpitations, Dr. L. McKnight took Alexia's pulse and confirmed that it was irregular and bradycardic (Tr. 4/10 at 126:20-22). He then advised her to see a Cardiologist (Tr. 4/10 at 67:4-5)

Dr. L. McKnight testified that initially he was extremely skeptical that an AMI meter was causing Alexia's symptoms or that EMF was could cause health effects. However, he later became convinced only after a long

series of events living with Alexia (Tr. 4/10 at 123:16-18), including statements that established that Nocebo effects were not playing a role (Tr. 4/10 at 124:16-20. McKnight Exhibit 6 at page 1).

Dr. L. McKnight testified that in his expert medical opinion the syndrome of electrical hypersensitivity is caused, at least in some cases, by EMF. He bases this opinion in part on the fact that Dr. Rea's study (McKnight Exhibit 13) was positive (Tr. 4/10 at 163:16-19), in part because of a study by Dr. McCarty (Tr. 4/10 at 166:9, https://www.defiltersllc.com/wp-content/uploads/2018/01/McCarty_Marino_2011_EMF_ES__neurological_syndrome_Int_J_Neurosci_July.pdf), in part because of other studies that are not themselves conclusive or convincing, but add to the weight of the subject, and in part because of the personally witnessed events in Alexia (Tr. 4/10 at 167:11).

Dr. L McKnight testified that in his expert medical opinion, it is beyond reasonable medical certainty that the AMI meter was causal for Alexia's symptoms (Tr. 4/10 at 128:7-17). He clarified that after stacking the event probabilities he believes it to be more like 95% certain (Tr. 4/10 at 197:25).

Dr. L. McKnight gave credible explanation of his rational which included a thorough review of the medical literature (Tr. 4/10 at 125:6-7) and how that review included specifically evaluation of the studies referenced or done by Dr. Rubin (McKnight Exhibit 7,8,9) and those that reference such studies such as the WHO report (McKnight Exhibit 15) and Dr. Israel's pre-filed report (PECO Exhibit MI-3). In his review, he found these contained major statistical errors because, among other things, they did not properly account for the issue of spectrum bias (Tr. 4/10 at 118:9; 171:13; 174:17-19) which he explained is caused by the tendency of the sickest patients to not volunteer, thus skewing the randomization (Tr. 4/10 at 115:17-21, McKnight Exhibit 6 at page 5).

Dr. L. McKnight testified to the use of best practice methods (McKnight Exhibit 14) in Evidence Based Medicine as he reviewed the medical literature of this subject. He testified to the importance to adhere to those principles including the need to systematically look for bias (Tr. 4/10 at 127:13-15 McKnight Exhibit 6 at page 5), consider both false positives and false negatives (Tr. 4/10 at 114:7-11, McKnight Exhibit 6 at page 8), and the understand the distinction between studies of therapy and studies of harm (Tr. 4/10 at 114:24-25 McKnight Exhibit 6 at page 4). He also pointed out common pitfalls commonly made in such evaluations, such as ignoring type 2 errors (McKnight Exhibit 6 at page 8, McKnight Exhibit 10), or attempting to draw inference from uncertainty (McKnight Exhibit 6 at page 7), or making false appeal to authority (McKnight Exhibit 6 at page 10)

Dr. L. McKnight testified that clarity of mechanism is not required to make medical decisions when a proximal cause has been identified, and cited the cigarette-cancer link as a common example where all exact chemical mechanisms are still not known, but the proximal cause is, and therefore we avoid the proximal cause (Tr. 4/10 at 130:7-14, McKnight Exhibit 11).

Dr. L. McKnight expressed his medical concern over Alexia's safety that another smart meter may cause more harm (Tr. 4/10 at 129:9) through 3 possible mechanisms of EMF transmission which need to be mitigated in PECO's accommodation. These 3 mechanisms include 'dirty electricity' (conducted transients), Radio Frequency, and a secondary antenna effect from the AMI meter transmitting over household wiring (Tr. 4/10 at 90:7-22; 200:1-6).

Dr. L. McKnight testified that in his understanding, analog meters were the safest design for patients like Alexia, and that it would be an experiment to see if other kinds of meters might work (Tr. 4/10 at 131:9-13).

6.2.2.2 Dr. Peter Prociuk testified to harm and causality

Dr. Prociuk was established as an expert in the field of medicine, and has acted as Alexia's personal physician since roughly 2010 (Tr. 4/11 at 243:8-9)

Dr. Prociuk testified that the smart meter was injurious to Alexia' health and causal for her palpitations (Tr. 4/11 at 258:21-25.) and that a smart meter is unsafe for Alexia (Tr. 4/11 at 259:10).

Dr. Prociuk testified that in his expert medical opinion it is beyond a reasonable degree of medical certainty an AMI meter will cause an exacerbation of Alexia's symptoms and specifically cause another cardiac arrhythmia. (Tr. 4/11 at 256:17-23)

Dr. Prociuk testified that the health issue with respect to smart meters is entirely related to EMF. (Tr. 4/11 at 312:3-5).

Dr. Prociuk testified that (for patients like Alexia) his concern is over all sources of EMF including reduction of harmonics, and recommends things such as turning off non-essential circuits at night. (Tr. 4/10 at 83:8-16)

Dr. Prociuk reviewed Dr. Saleem's records (PECO Cross McKnight Exhibit No.1) and recalled specifically a conclusion to the effect that "in the absence of any obvious cardiac 'history, that EMF exposure is a likely cause of her palpitations" (Tr. 4/11 at 254:8).

Dr. Prociuk wrote a letter to Secretary Chiavetta (Complainant Joint Exhibit PP-4) stating, "my unequivocal assertion that the installation of the AMI Smart Meter on Alexia McKnight's house is a strict medical contraindication." (Tr. 4/11 at 254:24), and further clarified that to him this he "means under no circumstances should she be exposed to this on an ongoing basis" (Tr. 4/11 at 254:15-16).

Dr. Prociuk testified that a normal physician would not know legal phrasing or implications when guided by a pro se legal team. (Tr. 4/11 at 309:4-10)

Dr. Prociuk supported the rational for his opinion based on understanding Alexia's history, and in part based on Dr. Rea's study, and in part based on a study by Lamech (Complainant Joint Exhibit PP-3) showing similar observations from Switzerland and Austria, in which heart palpitations and other symptoms in Alexia's presentation (e.g. headaches, irritability, and palpitations) (Tr. 4/11 at 258:12-22) were seen in a RF dose response relationship with smart meters. He also cited that in that study there was no association with a health worrying personality (Tr. 4/11 at 304: 15-25).

Dr. Prociuk testified (like Dr. L. McKnight) that Dr. Rea's 1991 study demonstrated that the syndrome of EHS definitely exists and can be caused by EMF (Tr. 4/11 at 268: 2-24).

Dr. Prociuk testified that the role of a clinician is different than being a scientist because they act is an interface between the scientist and the patient's subjective experience (Tr. 4/11 at 290:22-23). In this role, standards of care allow them to act on clinical science that is still in infancy, or not yet entirely established. (Tr. 4/11 at 290:1-3). He further identified that this distinction is made because clinicians work on individual cases (Tr. 4/11 at 297:17).

Dr. Prociuk testified that the combination of lightheadedness and the pulse rate of 30 as Dr. L. McKnight testified to would indicate a very significant problem with her heartbeat. (Tr. 4/11 at 303:16-18).

6.2.2.3 Dr. William Rea testified to harm and causality

Dr. Rea was declared a medical expert with specific specialty in EHS (Tr. 4/12 at 58:11-18)

Dr. Rea has seen and examined Alexia, and acts as her specialist physician (Tr. 4/12 at 58:9-10).

Dr. Rea has seen more than 1000 patients with EHS. (Tr. 4/12 at 57:6)

Dr. Rea has published extensively in the area of environmental medicine and EHS (Tr. 4/12 at 57:8-16)

Dr. Rea testified he has done significant research in the area of EHS specifically and conducted a study in study (McKnight Exhibit Number 13) clearly demonstrating that there are some patients who are unusually sensitive to EMF. This study shows that, while not everyone that claims, "I'm sensitivity to EMF" actually is documented to be sensitive to EMF, a smaller percentage of them (about 16%) can be confirmed sensitive on testing. Dr. Rea confirms this was double blinded (Tr. 4/12 at 71:12-14) and has been reproduced (Tr. 4/12 at 71:19-23).

Dr. Rea testified that EHS is different from Idiopathic Environmental Intolerance from EMF (IEI-EMF) because EHS is due to EMF. It is not idiopathic (Tr. 4/12 at 96:12-15).

Dr. Rea testified that arrhythmia is a common finding in patients with EHS (Tr. 4/12 at 70:4-5).

Dr. Rea reviewed the records of Dr. Prociuk and Dr. Saleem (Tr. 4/12 at 63-66).

Dr. Rea performed randomized double blinded EMF provocation on Alexia where she responded only to real EMF challenges, but not to blanks (Tr. 4/12 at 60:12-14; 67:6-17).

Dr. Rea testified that Alexia is clearly electrically sensitivity (Tr. 4/12 at 68:7)

Dr. Rea specifically considered alternative causes for Alexia's symptoms including Nocebo or psychologic origins, and ruled these out (Tr. 4/12 at 69:1-6).

Dr. Rea testified that Alexia's therapy includes avoidance of smart meters (Tr. 4/12 at 72:20-22).

Dr. Rea testified that it is not uncommon for smart meters to cause problems for patients with EHS (Tr. 4/12 at 74:2-4).

Dr. Rea testified that beyond reasonable medical certainty that the smart meter was what caused change Alexia's health, and specifically was the cause for her arrhythmia (Tr. 4/12 at 74:5-18).

Dr. Rea testified that another smart meter would be unsafe for Alexia (Tr. 4/12 at 75:12-16).

Dr. Rea testified that he recommended an analog meter because they have been tolerated by those with EHS, and other kinds of meters had not been tested (Tr. 4/12 at 76:6-17).

6.2.2.4 Dr. Mark Isreal cannot rebut these claims

6.2.2.4.1 Dr. Israel's legal representation is questionable.

We are told that Mr. Watson, Dr. Israel's legal representation, is invalid to practice law the state of Pennsylvania without Pro-Hac-Vice. Mr. Watson did not file Pro-Hac-Vice paper work properly in our case (Tr. 4/13 291:6-16).

This out of state team has testified regularly (Tr. 4/10 at 219:20-21; Tr. 4/13 at 229:24-230:4) for PECO and uses these 2 handsomely paid (Tr. 4/13 at 230:6) professionals to do trivial standard templated reviews and sit in the back of a court room for 3 days for a 2 hour spot in scripted (to the point where this witness was literally reading

this script on stand!) testimony against primarily pro-se litigants like us that are inexperienced on how or what to admit into legal evidence correctly (Tr. 4/11 at 309:4-22) or use other standard legal tactics such as known when and how to object in a testimony.

If Mr. Watson does so much work in the state of Pennsylvania, we suggest he really should get a license to practice here, but at minimum PECO's legal team should at least be familiar with the process of Pro-Hac-Vice since they have done this so many times in the past, but mysteriously not for our specific case.

6.2.2.4.2 Dr. Isreal is not an expert in this condition.

Dr. Israel probably knows quite a bit about pediatric oncology (Tr. 4/13 at 176:22), and perhaps has some experience guiding parents about cell phone use, and the risk of cancer associated with cell phones.

However, he simple cannot be considered an expert in the condition or situation of a patient with EHS or IEI-EMF.

Dr. Israel testified he did a 'medical evaluation' of Alexia's case (PECO Exhibit MI-3), and that his 'medical evaluation' came from submitted medical records (Tr. 4/13 at 240:15-16), the studies described in his PECO Exhibit MI-3, and his lifetime of experience in medicine. (Tr. 4/13 at 241:3-4).

His lifetime of medical experience however does NOT include:

1. Ever writing any books or papers on the topics of EHS or IEI-EMF (Tr. 4/13 at 183:8-10).
2. Ever seeing even a single patient with this syndrome (Tr. 4/13 at 183:5-7).
3. Ever seeing Alexia, the patient (Tr. 4/13 at 239:11-12).

Additionally, he admits he does not have a current active practice (Tr. 4/13 at 229:16-17).

Dr. Israel does believe that people with EHS have real symptoms. (Tr. 4/13 at 285:24-25). However, he admits he does not have any idea what he would recommend to a patient with EHS or IEI-EMF, and states "I haven't thought about it." (Tr. 4/13 at 230:14-21), despite study of the subject for more 32 years (Tr. 4/13 at 230:14-17) and claims that this is "a big part of what I think about" (Tr. 4/13 at 183:15-20), and the fact that he has "made a deep commitment to understand this and to be able to explain to my patients the impact of it on their lives and on them" (Tr. 4/13 at 184:7-10).

Without ever seeing a patient he could not and does not know how to interpret important clinical details in the literature that are important to consider. For example, he missed important clinical details such as the temporal delays between exposure and symptom onset and resolution that could cause a real exposure preceding a sham exposure to cause an invalid measurement of the sham. Dr. Israel agrees that it would be important to know if a patient had a problem from one test period and that problem persisted into the test period, (Tr. 4/13 at 263:21-25), but, for example, he doesn't recall if he checked that in his reference of Eltite 2002 (McKnight Cross Israel Exhibit 3, PECO Exhibit MI-3 at page 2-3), even though it is one of only 3 articles he referenced in preparation for this case.

Dr. Israel testified that even while he has a specialty in oncology and acted as director for a national cancer center where a major proportion of the patients seen at that cancer center have lung cancer (Tr. 4/13 at 276:9-11), his familiarity with lung cancer is 'in the same ballpark' as knowledge of 'EHS' (Tr. 4/13 at 241:23-25). And, perhaps that explains why he did not know of the smoking cancer link history such as how the smoking cancer causality was established (Tr. 4/13 at 242:8). This is despite the extensive publicity over this issue, and the fact

that Dr. L. McKnight even included an article on the subject with this answer in this case (McKnight Exhibit 11). That article would have told him, for example, that causal links in Cancer were determined from multiple lines of evidence and never typically require blinded provocation studies (which for example Dr. Rubin and the WHO argue are required before EHS could be established to be caused by EMF).

Dr. L. McKnight's exhibit would have also reminded him of a time in 1960 where a third of physicians did not believe cigarettes to cause cancer (McKnight Exhibit 11, page 89 under popular knowledge and ignorance; Tr. 4/13 at 244:18-245:13). It would have also informed him of the prolonged history where the tobacco industry sponsored 'industry friendly' science to demonstrate that causality was not sufficiently established, and because of this argument from industry it caused at least a 10-year delay from 1953 to 1964 before authorities finally made any statement regarding the harm associated with cigarettes. So, if he had lived and practiced in that period he would have been presented with the exact dilemma discussed (Tr. 4/13 at 245:8-9). For the lawyers, this case is also well documented and argued for example in the 1600-page opinion or US, et. al. v Phillip Morris USA, Civil Action No. 99-2496 (GK) (e.g. https://www.justice.gov/sites/default/files/civil/legacy/2014/09/11/amended%20opinion_0.pdf), which outlined exactly how the tobacco industry did this, and begins with the findings of fact on page 15 to confirm the dates and events in the exhibit, but is especially notable for the quote from the public relations internal memo on page 21 (51 of the pdf):

> *"There is only one problem -- confidence, and how to establish it; public assurance, and how to create it -- in a perhaps long interim when scientific doubts must remain. And, most important, how to free millions of Americans from the guilty fear that is going to arise deep in their biological depths -- regardless of any pooh-poohing logic -- every time they light a cigarette. No resort to mere logic ever cured panic yet, whether on Madison Avenue, Main Street, or in a psychologist's office. And no mere recitation of arguments pro, or ignoring of arguments con, or careful balancing of the two together, is going to deal with such fear now. That, gentlemen, is the nature of the unexampled challenge to this office."*

This becomes relevant to physicians because as Dr. Davis points out, there are economic challenges to accept that EHS can be caused by EMF, and the problems are not rooted in the biology, but instead revolve around the enforcement of the policies where major industries are involved and there are real conveniences and economic benefits (Tr. 4/13 at 124:24-125:7). Nobody denies that cell phones and wireless is useful for the masses. But, because of this if the FCC needs to regulate to ensure health effects for all (meaning that they might need to account for unusually sensitive patients like Alexia), then it might mean that they 'shut down every radiofrequency communication in the country' (Tr. 4/13 at 124:4-7). Regulators are rightly concerned about consumer confidence and economic balance like this. But, physicians can be stuck in the middle when they see that some patients can be afflicted and need to argue on their behalf when the FCC regulations have been misinterpreted by some that want to use this as a mechanism to mandate submission.

Dr. Israel might have realized this dilemma if he had ever seen a patient with EHS and watched as they suffer. But, he has not ever seen a patient like this. Instead, as he states, "I haven't thought about it." (Tr. 4/13 at 230:14-21).

6.2.2.4.3 Dr. Israel's 'literature review' is questionable, at best.

Dr. Israel's technique of review mentions that he uses methods of statistical analysis and any other factor that may affect the reliability of the study data (PECO Exhibit MI-2 at page, item 3). He states that he is 'always on alert for areas where bias might come in.' (Tr. 4/13 at 248:10-11).

Dr. Israel demonstrated that he is completely unaware of standard techniques to identify study bias. He is therefore unreliable in how he interprets the conclusions in the medical literature he reads.

For example, Dr. Israel states that Rubin's 2006 study (McKnight Exhibit 8) dropout rate was not significant because 'there were similar number of people in each of the experimental groups that dropped out' (Tr. 4/13 at 226:6-8). This is blatantly, and obviously false to even the most untrained reader! Figure 1 on the top of page 3 show the numbers. The standard technique is to measure this from the time of randomization. 9 subjects dropped out of the control group while 23 subjects dropped out of the 'sensitive' group. So, more than twice as many participants dropped out of the sensitive arm. Further, looking only at who made it past the questionnaire, 100% of the drop outs were in the 'sensitive group.'

Dr. Israel goes on to state "both of these groups had about 50% record of detecting…". However, the study did not record data in a way that this could be determined. Instead, Rubin used a 'symptom severity' and 'confidence' score, and Rubin reported that the averages of these scores which did not statistically separate within any group. This was not a binary choice where '50%' could even be determined.

So, Dr. Israel concludes that these drop outs don't matter because the characteristics don't change. Dr. Israel's misperception is why the JAMA Users Guide wrote a whole chapter on this subject of drop outs, explaining exactly why and how this significantly alters the interpretation of the conclusions (McKnight Exhibit 14). The literature can be confusing without training on how to read it correctly, and thus a 'users guide' is needed.

And, beyond this discussion, it might also be pointed out that this Rubin study was additionally significantly criticized because it was later identified that sham arm used a device that was in fact emitting significant EMF (primarily magnetic fields as opposed to RF, and thus explaining the symptom rise over time seen in all groups in figure 2). Dr. Rubin is at least honest enough to admit this in his 2010 review (McKnight Exhibit 9 at page 9, 1st column, line 11), albeit in a very "buried, obscure detail" kind of way as "that low level leakage from the equipment during sham exposures may invalidate any comparison." But, Rubin isn't honest enough to remove the study from his counting of his '47 negative studies'. Instead, Rubin counts it as a valid negative. Dr. Israel misses that important detail as well.

Dr. Israel further cites the paper by Hietanen 2002 (McKnight Cross Israel Exhibit 2) in his pre-filed report as 'high quality' (PECO Exhibit MI-3 at page 2, last para) despite the unaccounted 35% drop out rate that alone completely invalidates this study. When this error was pointed out on cross exam (Tr. 4/13 at 350:20-23) Dr. Israel admits he isn't even sure what a drop out is (Tr. 4/13 at 254:2) and Mr. Watson objects by stating "just show me…where they say seven people dropped out" (Tr. 4/13 at 254: 19-20).

Beyond the fact that the study does actually state this (McKnight Cross Israel Exhibit 2 at page 268, last 3 lines)

> *"A few subjects perceived such intolerable symptoms that they decided to discontinue at early stages of some tests. Six subjects agreed to 3 sessions and one only 2 sessions."*

Table 3 shows that all 20 sham exposures are accounted for, but all the real exposures are not accounted for so, all of these patients dropped out during a real exposure, and complaining of severe symptoms. Importantly,

there is no appropriate analysis in this study to show how this would affect the results, therefore it is up to the reader to do this.

Dr. L. McKnight provided a reference of an entire chapter (McKnight Exhibit 14) describing the importance of this for a reason. This exhibits states, for example on page 148 (2nd page of the entered exhibit, line 13)

> *"Clinicians evaluating an RCT need to know whether the researchers followed intention-to-treat principle. …. Thus, readers must look not just for this phrase but also for what the trial investigators actually did." (emphasis added)*

And later (2nd column under 'conclusions')

> *"For RCT's to provide unbiased assessments of treatment efficacy, investigators should adhere to the intention to treat principle and present analyses in which all patients are included in the groups to which they were randomized. … Readers need to check what was actually done in the analysis with respect to 2 crucial threats to validity: patients who did not follow the protocol and patients lost to follow-up." (emphasis added)*

In both cases, these patients did not follow the protocol, and that is, by definition, what a 'drop out' is.

The user's guide mentions this in the context of therapy, because RCT's (randomized control trials) should not be done for trials of harm in the first place, but the concern over affecting bias the study is because it affects the randomization of a RCT. The principle is not exclusive to therapy per say. But, relevant the point is that this is the *readers* job. Dr. Israel, the reader, seems unaware that it this is his job as he critically reads and assesses to see if bias is there, and seems totally unaware of how to determine this.

Dr. Israel also states that there are studies that show that people are interested in and willing to participate in provocation studies because there are studies each year (Tr. 4/13 at 224.3-5). This demonstrates how he completely misunderstands the concept of randomization. Beyond the fact that are many quotes even in Rubin's papers about this difficulty in general, the issue with Spectrum bias is that it represents the tendency of the sickest patients of the group to not participate, thus *skewing* the sample. It has nothing to do with the sample size per say (that is another problem), its simply that the sample is not representative and has different characteristics (McKnight Exhibit 6 at page 5). This is further explained for example in McKnight Exhibit 14 at page 360 under "distribution of test results illustrates the spectrum problem."

> *"A crucial issue in the design of diagnostic test study is the distribution of severity of illness or abnormality among the patients who were enrolled. We refer to this distribution as the spectrum of disease, illness or abnormality"*

And, again on page 360, in the first column

> *"If investigators choose clinically inappropriate populations for their study of a diagnostic test (introducing what is sometimes called spectrum bias), the results may seriously mislead clinicians."*

Again, the studies referenced by Dr. Israel are the bizarre use of an RCT study of harm in humans, but the same statistical principle holds from diagnostic testing because it represents the first step of even calling the diagnosis of EHS vs IEI-EMF. It 'seriously misleads clinicians' because the patients seen in the studies (and don't drop out)

do not represent the full population of patients as seen by clinicians in their offices. The studies are missing the sickest patients and overrepresenting the less sick.

Dr. L. McKnight on the other hand also showed how using these standard techniques, techniques published by the American Medical Association, and accepted by nearly all medical societies, show that specific articles Dr. Israel relied upon as the basis for his opinion are inherently flawed. Dr. L. McKnight explained how Dr. Israel and other authorities including the WHO have likely become confused and misinterpreted this complicated data because they only looked at the authors conclusions rather than doing a more serious analysis. He also discussed an apparent confusion between a study of therapy and a study of harm (McKnight Exhibit 6 at page 4), Dr. L. McKnight explained that for this reason, no quantity of 'randomized blinded provocation' studies would ever be able to show that EMF is NOT the cause of EHS, and the correct interpretation of any negative study of this type is automatically that it has no relevance. These studies cannot be relevant because the negative result is explained from the spectrum bias alone. They are not negative to mean less likely to cause. They are *Invalid*. Invalid studies make no weight in favor that EMF is the cause or not.

So, citing only these 'negative' (actually invalid) randomized blinded provocation studies and an appeal to authority, Dr. Israel misinterprets studies that state 'no evidence found' this to mean 'not caused by' (Tr. 4/13 at 198:4-6). No evidence means there is uncertainty. 'Not caused by' mean there is certainty. Similarly when he opines that there is '..no medical basis to conclude ..' In this, Dr. Israel confuses the concept of 'uncertainty' (e.g. A negative study asserting I do not know if EHS is caused by EMF) with 'falsity' (e.g. A study showing that it is false that EHS is caused by EMF). This error, though common, results in an 'Argument from Ignorance' (where one argues from an uncertainty as opposed to a certain falsehood). It results in unreliable inferencing to conclusions (see McKnight Exhibit 6 at page 7). It is universally recognized as a logical fallacy based on first order logic.

6.2.2.4.4 Dr. Israel does not know Alexia or her medical situation.

Dr. Israel has not taken a history or examined Alexia (Tr. 4/13 at 239:11-12). Indeed, he is the only physician in this case who bases his opinion strictly off medical records. He has no firsthand knowledge of Alexia.

Dr. Israel's states that his 'medical evaluation' came from submitted medical records (Tr. 4/13 at 240:15-16), and the studies described in his exhibit (PECO Exhibit MI-3), and his background experience. (Tr. 4/13 at 241:3-4). However, Dr. Israel testified that "It would be just totally inappropriate for me to try to make a suggestion for what [Dr. L. McKnight] should do [concerning Alexia's condition]" because he knows so little about the situation (Tr. 4/13 at 231:12-14). Dr. Israel admits he does not know what is causing Alexia's symptoms (Tr. 4/13 at 239:4-7).

And yet, he also did not ask for any further information or medical records from the McKnight's to make a more complete evaluation. (Tr. 4/13 at 269:21-270:1).

And, he never really rebutted any reason why it would be inappropriate for Alexia's physicians to recommend avoidance. At best all he would state is that (in his limited capacity of knowing very little about the subject) that he personally does not see any reason to believe therapies might work (even while they were and are working), and perhaps that he thought we should have consulted more specialists even after her symptoms had resolved (because the recommended avoidance is working).

Dr. Israel states that he cannot understand enough to agree or disagree with the quote of (Tr. 4/13 at 236:17-25; McKnight Cross Israel Exhibit 1 at page 1, last para) that states

> *"Good doctors use both individual clinical expertise and the best available external evidence, and neither alone is enough. Without clinical expertise, practice risks becoming tyrannized by evidence, for even excellent external evidence may be inapplicable to or inappropriate for an individual patient. Without current best evidence, practice risks becoming rapidly out of date, to the detriment of patients."*

This quote is self-evident. Dr. Israel cannot agree because this quote states why he isn't qualified to make any statements about Alexia. He does not know the individual patient, and therefore cannot bind any of the literature he reads about to her situation. This quote also explains why Dr. Prociuk and Dr. Rea CAN make appropriate medical decisions about Alexia. They have both have reviewed the evidence AND know the individual patient.

6.2.2.4.5 Dr. Israel misses critically important details of Alexia's case.

In his pre-filed testimony Dr. Israel acknowledges that Alexia's symptoms were experienced when the PECO AMI meter was installed at the Complainant's residence, and disappeared and subsided when the meter was not installed. (Tr. 4/13 at 201:20-24; PECO Exhibit MI-3 at page 5, para 3). He concludes that this is consistent with IEI-EMF.

But, in testimony, Dr. Israel is careless when reviewing the details of Alexia's history, even the facts he has access to. In particular, he completely ignores any temporal aspects of events. He jumps to note the negative labs and tests as lack of evidence that she ever had signs or symptoms – overlooking the temporal history of events to understand how the labs and tests correspond.

For example, while he does agree that cardiac arrhythmia would be 'dangerous,' (Tr. 4/13 at 216:20-21) he notes Dr. Saleem's normal cardiac exam (Tr. 4/13 at 209:18; 213:3) and uses this to concludes that there never was an arrhythmia. This examination note was dated June 20, 2016 (Tr. 4/13 at 207:17) in a period, when the AMI meter was NOT on the house, and had been off the house since May 24 (Tr. 4/10 at 8:15-17), and during a time which Alexia was NOT complaining of symptoms (Tr. 4/10 at 12:21-13:3).

Alexia testified that symptoms improved dramatically within 1 week of the PECO AMI meter removal on May 24, and within 1 month all symptoms including the arrhythmia disappeared (Tr. 4/10 at 12:24-25). These symptoms are not explained by any other cause that Dr. Saleem could find. It therefore argues for causality, because Alexia is otherwise a credible witness. Alexia's complaints of lightheadedness in the setting of checking her irregular and slow pulse, and Dr. Lawrence McKnight's secondary witness of these events are NOT explained through any known cardiac disease in Alexia, and are thus quite unusual for someone in otherwise normal health. Dr. Saleem noted a structurally normal heart and thus writes:

> *"She has made appropriate changes in her home environment, and has noted an improvement. PECO has removed the wireless meter at this time, which correlated with a significant improvement in symptoms immediately and complete resolution of palpitations, lightheadedness, and back pain over a period of 3-4 weeks' time. I appreciate the decision of PECO to remove the wireless meter from her property." (PECO Cross McKnight Exhibit 1 at page 3-4).*

In other words, Dr. Saleem states that it is most reasonable to keep doing what works, and sees no need to further investigate other causes.

The fact that Alexia's symptoms resolved with removal of the AMI meter, then returned on 2nd installation, then resolved on removal of the PECO AMI meter again, further support an interpretation that there is something fishy about the AMI meter. But, the continued resolution of this issue while the PECO AMI meter was off the house for over 1 year afterward suggest strongly that something from the PECO AMI meter as the proximal cause, and further supports that avoidance of the PECO AMI meter works. Else, why did Alexia have the irregular and bradycardic pulse noted by Dr. L. McKnight prompting her to see Dr. Saleem in the first place, and why did this only occur in correspondence to her other symptom exacerbation (headaches, 'brain fog', etc) and only when the AMI meter was installed?

Dr. Israel is highly critical for Dr. Rea not referring this serious medical conditions. For example, he would send Alexia immediately to a specialist if he were in Dr. Rea's shoes (Tr. 4/13 at 216:15-18; 217:15-18). Again, Dr. Israel forgets the timing of events that was presented. By the time Alexia saw Dr. Rea, she was not having these problems anymore because the PECO AMI meter was removed, and this was working for her. Dr. Rea only confirmed that this story is entirely consistent with this other experience, and that given her other testing advises strongly continued avoidance of the AMI meter. This is entirely rational because what she was doing was apparently working. Dr. Israel, on the other hand, suggested sending Alexia to more specialists for her already solved problems. This is not rational.

Dr. Israel is similarly critical of Dr. Rea's diagnosis of toxic encephalopathy and suggests that if this was true then Alexia should have been referred to an expert for this. Again, what he misses is that this is Dr. Rea's reference explanation for Alexia's historical symptom of 'Brain fog' – a symptom that had since resolved by the time Dr. Rea did his evaluation, and a symptom that resolved in Dr. Rea's opinion precisely because the meter had been removed. This 'diagnosis' means literally 'toxic' meaning an external exposure to something that is dangerous or harmful (in this case namely EMF, but in other contexts could be a virus, bacteria, a chemical, or radiation) and 'encephalopathy' meaning some any disease where the brain function is affected. There was no need for Dr. Rea to provide a medical referral at that time because he is just confirming what the cause was. The events had resolved through what Dr. Rea also recommended as the continued therapy – avoidance of the AMI meter and other EMF emitting devices. There was no indication for referral here.

Dr. Israel did testify that "It would be just totally inappropriate for me to try to make a suggestion for what [Dr. L. McKnight] should do [concerning Alexia's condition]" because he knows so little about our situation. (Tr. 4/13 at 231:12-14). That's true. But, it's also why he is also makes inappropriate criticism of Dr. Rea. He read PECO's script, and skimmed through records, but did not investigate the details or seriously think about the case.

Dr. Rea's expert witness of hundreds of other similar cases and review of thousands of articles (Tr. 4/12 at 69:12-22), and Dr. Prociuk's citation of a case series (Complainant Joint Exhibit PP-3) with similar experience further establish the case, that this phenomenon is not unique. Dr. Israel offers little rebuttal to these other experiences except to offer his own opinion that any positive studies were not high enough quality, and that he thought the few negative studies he read were perhaps better. However, as noted above Dr. Israel has demonstrated that he does not appear to know how to critically read the literature in the first place.

Again, Dr. Israel testified that he does not have any idea what he would recommend to a patient with EHS or IEI-EMF, nor has he even thought about it (Tr. 4/13 at 230:14-21). He never examined Alexia, or any other patient with EHS so he has literally no patient framework for how to bind the literature he read to real patients. Why would he have thought about this. It's not his area of practice.

6.2.2.5 Dr. Christopher Davis cannot rebut these claim

6.2.2.5.1 Dr. Davis' legal representation is questionable.

As with Dr. Israel, Mr. Watson, Dr. Davis' legal representation is questionable because he does not have a license in the state of Pennsylvania and his lawyers apparently did not file Pro-Hac-Vice properly.

6.2.2.5.2 Dr. Davis argues scientific generalities, not application of the science to an individual patient.

Dr. Davis is unable to make a medical assessment or rebut the physicians claims directly because he is not a medical doctor. Treating physicians can opine in an individual sense because they know the details of the individual (Tr. 4/11 at 297:17). As Dr. Prociuk points out act is an interface between the scientist and the patient's subjective experience (Tr. 4/11 at 290:22-23). But, Dr. Davis' arguments can only be as a scientific expert in a general sense. Therefore, to establish that Alexia's treating physicians are wrong he must prove in a general sense that it is impossible for ANY person, no matter how sensitive, and no matter how their biology might be affected by disease could ever have effects from the EMF generated by a PECO AMI meter.

There is really no way he can establish this general case because there is too much complexity and variation in biology, and there are too many unaccounted-for methods by which a PECO AMI meter may have transmitted effects of EMF. And, the scientific literature never makes any statement that this is impossible, but instead supports that there are very good reasons to believe it can.

To make his case, Dr. Davis makes a simple appeal to authority in the FCC (McKnight Exhibit 6 at page 10), and attempts to imply that FCC limits prove that no person on earth could be affected. The FCC limits simply do not assert this proof. The FCC is not available to cross examine, so this claim without backup explanation is not expert testimony. But, further, Dr. Davis is unable to explain his rational for how the FCC limits account for unique biologic differences of all people, and therefore is unable to rebut the claims in a general sense. Indeed, as explained further below, the FCC does not even make this claim, but acknowledges that there is literature to suggest they may not have considered all cases, and are therefore watching this (McKnight Cross Davis Exhibit 1; Tr. 4/13 at 138:3-15).

Despite repeated attempts, Dr. Davis refuses to say that the FCC limit establishes that no person on earth could have a biologic effect (Tr. 4/13 at 115:1-2; 115:18-19; 119:17-20; 122:10; 139:16-25), because he knows this is simply untrue.

Ironically, Dr. Davis admits the complexity and quandary of the FCC's position in his explanation of other countries that have attempted to set lower limits such as Switzerland (Tr. 4/13 at 124:24-125:7). His argument is NOT that Switzerland's limit was incorrect to consider that unusual sensitivities exist but rather the Switzerland could not *enforce* the limit because there are many practical uses of RF at the higher doses. The FCC, or any regulatory agency, is stuck in a complex situation of attempting to ensuring the safety of a few individuals vs a large economic impact for many individuals. In this complicated evaluation, presumably the few affected can choose avoidance in the same way that a person with a peanut allergy may normally avoid eating peanuts. Unfortunately, in this case Alexia cannot avoid the exposure.

PECO's argument is that RF is a mandated requirement because of Act 129.

6.2.2.5.3 Dr. Davis admits he is unfamiliar with medical and biologic concepts.

Dr. Davis testified that his knowledge of biology comes 'by osmosis' (Tr. 4/13 at 17:10-14), and that he does not have formal training in biology other than a course in biophysics as a graduate student (Tr. 4/13 at 17:3-6). And,

when questioned about medical articles, he admits he would defer those questions to physicians such as Dr. Israel (Tr. 4/13 at 152:12). Dr. Davis indicated that he did not know things such as risk played a role in setting the standards. (Tr. 4/13 at 125:17-20).

Despite this, Dr. Davis apparently feels qualified to criticize medical articles such as Dr. Rea's study.

Dr. Davis testified that Dr. Rea's study was exposing his subjects to magnetic fields not electric fields. (Tr. 4/13 at 62:21-22). This is true. Dr. Rea tested at both high and low frequencies, and it is true that magnetic fields are present particularly at the low frequencies – that is what Alexia is sensitive to at the common 60Hz. In a normal household wiring this magnetic effect only occurs when there are wiring errors and there is unbalanced current flow (e.g. a crossed circuit). This is because normally the positive and neutral wires run together, and their magnetic fields that cancel, but when the current is not balanced it creates a detectable magnetic field. These were in fact the wiring errors that Mr. LaDuca found we had fixed (Tr. 4/10 at 20:2-3), and yes, Alexia feels these, too. However, EHS is not limited to electric fields, and electric and magnetic fields are very closely related. Indeed, this is why it is called Electro*magnetic* Hypersensitivity, as opposed to just electric hypersensitivity, and it is why there is reference to Electro*magnetic* Fields (EMF), not just Electric Fields. Dr. Davis misses the key point of the study is to show that not every patient can pass this test, that SOME patients have different biology, and that this test can be used to reliably find them. It further demonstrates also that Dr. Davis has very little knowledge of the issues in EHS generally.

Dr. Davis testified that Dr. Rea's study was not sufficient quality because it did not include technical details of the setup such as the current stride in coils, size of the coils, the type of generator used to drive the coils, the specific environment that the subjects were placed in, and if the subjects were in a properly shielded room that isolated them from other fields and vibrations. (Tr. 4/13 at 63:23-64:8). Dr. Davis criticism would essentially invalidate every one of Dr. Israel's studies as well.

However, Dr. Rea's study does describe the environment and room shielding and verification of that shielding on page 242 (McKnight Exhibit 12 at page 2 MATERIALS AND METHODS). It specifically states that "the immediate test site of the patient had unmeasurable electric fields and magnetic fields in the vicinity of 20nT". It also describes the output coil size of 6cm in diameter, and 15cm tall. It describes the generator as a Model 3030, B.K. Precision Dynascan Corp. driving test square wave frequencies from 0.1 Hz to 5 MHz. Additionally, he gives many other details potentially confounding other provocation studies such as lighting and dust, that Dr. Davis does not mention, because they are relevant to the total patient as seen by an expert in environmental health. But, the fact that Dr. Davis criticizes thing like coil size or generator information when its written clearly makes it questionable that Dr. Davis even read this article.

Dr. Davis testified that he is quite concerned about noise vibration when exposed because this would let the subject know when they are exposed (Tr. 4/13 at 64:14-25). He suggests goggles and earmuffs. No other study mentioned in Dr. Israel's review mentions this as a significant concern, nor do they incorporate googles and earmuffs. It again demonstrates how he is not qualified to read a medical article primarily because his minor concern about the possibility of un-blinding in the study (if there actually is one) is strongly countered clinically by reading the results. In the result section Dr. Rea describes Results Phase IV. "… Example changes included a 20% reduction in pulmonary function and 40% increase in heart rate. In the 16 patients with positive reactions to EMF challenges, two had delayed reactions, gradually became depressed and finally became unconscious. Eventually they awoke without treatment. Symptoms lasted from 5 hours to 3 days." It is hard to fathom a 5-hour objective response such as decreased heart rate from somebody hearing a faint humming noise, and then

repeatedly doing this to distinguish from blanks or different frequencies. It's not clear if Dr. Davis missed this because he does not understand the medical considerations, or as above he just didn't read the article.

Dr. Davis testified that it is not accurate to call the study as double blind because there was an early phase was not double blind. (Tr. 4/13 at 66:8-9). Having a single blind followed by a double-blind study is quite common for most of the blinded provocation studies of this type. For example, both Rubin 2005, and Eltite 2007 describe what they call unblinded 'practice sessions' or 'open provocation' and yet these are both have 'double blind' in their title. In fact, Rubin even explicitly recommends this as best practice in his 2005 paper

> *"3) The inclusion of open-blind provocation sessions should be considered as a useful way of ensuring the face validity of the experiment." (McKnight Exhibit 7 at page.231, 1st column, item 3 of 'Implications for Researchers and Clinicians'.)*

However, Dr. Davis testified that we don't usually use humans as subjects for high-level exposures to see where something happens. (Tr. 4/13 at 114:20-21). On that one, he's correct, even if he might not understand why (Tr. 4/10 at 114:24-25; 171:13; 174:17-19; 118:9; McKnight Exhibit 6 at page 4).

6.2.2.5.4 Dr. Davis confuses important biologic topics and considerations.

To further make his points, Dr. Davis attempts to compute doses and compare them to the FCC levels. His computations can only reflect the reality if his input values and modelling assumptions are correct. It turns out that both his modelling assumptions and his input data are flawed, and therefore so are all his computations and comparisons. And, as stated above, the FCC levels may not be correct in all cases.

Dr. Davis' modelling assumptions reflect this ignorance and are incorrect because of a misunderstanding or failure to recognize how biology works. An again, he admits he does not have training in this area, but instead '…acquired a lot of knowledge in biology by osmosis.' (Tr. 4/13 at 17:11-14).

Dr. Davis testified that the distinction of ionizing radiation and non-ionizing radiation is important because the ionizing radiation which includes ultraviolet light has the ability to break chemical bonds in the body leading to biologic effects, where the in the non-ionizing radiation region, the energy of the photons do not have enough energy to break even the weakest bonds in the body. (Tr. 4/13 at 25:16-26:5).

He states this later in reply to a question over "what does it mean when you say 'safe'":

> *'Because at these low levels of radiofrequency exposure, there's no biologically significant heating. And the photons can't break bonds. There's no route from absorption of the RF energy to the breaking of any bonds. And if you don't break any bonds in the body, you don't get any chemistry change. And if you don't get a chemical change, you don't get the biological change.' (Tr. 4/13 at 109:13-21).*

This statement deserves extensive and special discussion because it appears to be the foundation of Dr. Davis' opinions and misunderstandings, but also because it demonstrates how he attempts to avoid answering questions. He is either deliberately ambiguous and attempts to confuse several unrelated concepts or confused himself because he has a significant misunderstanding of biology. Or both.

The problems with this statement are many:

1. He does not answer the question.

2. 'low levels' is ambiguous, and specifically confusing 2 very different levels of energy. One meaning is the energy involved to cause 'biologically significant heating', the other is the energy level of a single photon that might be able to break a bond.
3. With single photons, it is further ambiguous if by 'low levels' Dr. Davis is referring to photons of 'non-ionizing' radiation generally (such as visible light, or higher frequency RF), or specifically photons of a 901Mhz smart meter.
4. It is ambiguous which kind of bonds Dr. Davis is referring to, and under what conditions.
5. It is ambiguous what 'biologically significant heading' means, and if that means the same thing as 'non-thermal'.
6. In his pre-filed report, Dr. Davis qualified this similar statement with '… bonds in DNA' (PECO Exhibit CD2 at page 2, last 2 paragraphs), but in testimony he uses this statement *unqualified* leading to ambiguity over his intent to show that ANY biologic effect is impossible, or just effects related to DNA.

There are partial truths in Dr. Davis' statements, but the truth holds only within certain contexts, these contexts are inappropriately mixed. Overall, this statement is clearly false and there are several problems with his line of reasoning because:

1. It is not true that single photons (even at non-ionizing levels) cannot break bonds.
2. It is not true that a single photon is involved.
3. It is not true that 'if you don't break any bonds in the body, you don't get any chemistry change'. The biology involved is significantly more complicated than his mental model seems to account for.
4. To the extent that he is making any statements about DNA, these are irrelevant because Alexia is not complaining of Cancer, and it is questionable even with respect to DNA.

To fully understand this requires technical discussions which may be well beyond the capacity to do in a court proceeding in a constrained time period. This again is why a court like this is simply an inappropriate place to judge if science has or has not established a 'consensus.'

However, to explain his lack of biology experience and understanding, and thus how deeply flawed this statement some technical discussion is required so that the ALJ and commission can appropriately weigh his opinions.

First, the context for his statement 'low levels' is ambiguous. Dr. Davis' quote extends from his prior statement where he explained that 'non-ionizing radiation' is categorically different than 'ionizing radiation' (which includes ultraviolet light).

Dr. Davis admitted PECO Exhibit CD-2, and accepted this as testimony (Tr. 4/13 at 20:15-17) and (PECO CD-2 page 2, last 2 paragraphs) where he states "The ionizing Radiation category consists of sources of waves that have enough energy to break chemical bonds in DNA", and "The Ionizing radiation category also includes the Ultraviolet Light…" and "The Non-ionizing category of the electromagnetic spectrum consists of waves that do not have enough energy to break any chemical bonds including the chemical bonds in DNA."

The argument apparently is that since we are dealing with 'non-ionizing radiation' the photons do have enough energy to directly break bonds. And, in the context of a break in DNA, this would appear to refer to a simple, specific, known action of ionizing radiation photons having enough energy to cause cancer by directly breaking the bonds in DNA. It is true that ionizing radiation can directly break bonds in DNA, and this is a commonly understood mechanism by which can cause cancer.

However, he first attempts to extend this argument to mean that the non-ionizing/ionizing threshold energy level and conclude that single photons cannot break bonds and therefore no biologic effects in general happen. This is easily refuted. DNA is not involved. And, visible light (photons at frequencies lower than ultra violet) can also break a bond directly. This is a well described effect and what allows for the biologic phenomena of sight. Dr. Davis admits later in cross exam that vision works by photons directly breaking chemical bonds (Tr. 4/13 at 110:13-14). But, if by 'low levels' he means 'non-ionizing' levels, then vision or eye sight is a prime counter example. The fact that you can read this proves the error. You are reading with visible light of lower frequencies, and not reading by ultra violet light or ionizing radiation coming from this page. This works by photons breaking bonds directly, but in a much more controlled fashion, and not involving DNA at all.

Mr. Watson claims that Dr. Davis said the bonds of DNA and that Dr. Davis did not say all chemical bonds. (Tr. 4/13 at 112:23-25). However, the transcript record is clear. Dr. Davis does not use the words in DNA when discussing the issue on the stand. (Tr. 4/13 at 25:16-26:5). He therefore injects significantly expanded scope and meaning to his words by leaving out the context.

If, however, by 'low levels' Dr. Davis means something else, then it is unclear why he mentions the distinction of 'ionizing radiation' in the first place. And, there is new question about what he might mean by a 'low level' of energy, what 'non-thermal' means, and how he determined that combined photons cannot play roles to cause biologic effects except by thermal effects. Finally, he confuses how any of this relates to 'low levels' as described by the FCC limits or establish that at such a 'low level' that the FCC limit would be safe for all humans regardless of biologic variance.

There is significant irony in Dr. Davis' dependence on this testimony since his own paper refutes this assertion (Jose-Luis Sagripanti, Mays L. Swicord, and Christopher C. Davis (*1987*), Microwave Effects on Plasmid DNA. Radiation Research: May 1987, Vol. 110, No. 2, 219-231.)! Now an ancient artifact (official copy at http://www.rrjournal.org/doi/abs/10.2307/3576900), the abstract of his study reads:

> *"The exposure of purified plasmid DNA to microwave radiation at nonthermal levels in the frequency range from 2.00 to 8.75 GHz produces single- and double-strand breaks that are detected by agarose gel electrophoresis. Microwave-induced damage to DNA depends on the presence of small amounts of copper. This effect is dependent upon both the microwave power and the duration of the exposure. Cuprous, but not cupric, ions were able to mimic the effects produced by microwaves on DNA."*

Perhaps, Dr. Davis has changed his mind since this old paper, but it still begs the question – what meaning of 'low levels' or 'non-thermal' or single photon effects he is attempting to describe? Is he really trying to establish that the physics in general prevents this in general for all biologic systems?

Well established physics equations (Planks equation) would indeed show that, assuming only the radio effects of 901Mhz that the energy of these individual photons is quite low. But, to establish that the biologic effect cannot occur, Dr. Davis has not established that biologic effects can only occur by one photon acting on one chemical bond. Also, Dr. Davis does not explain which chemical bond energy he is talking about. Nor does he talk about the conditions under the chemical bond is broken (such as the presence of copper he notes above). Nor does he mention the large numbers of photons involved. Nor does he account for the concept of cellular biochemical cascades that amplify effects. Instead, he makes this statement as a generalized fact, as if he has computed this to be true for ANY biologic change, and under ANY 'non-thermal' conditions.

In fact, using logic that a single photon taken alone and out of context does not have energy to break a bond, and effects can only occur if bonds break, one could also easily show that thermal effects also do not occur (because individually each photon add little to altering the movement related to a heating effect detected at gross thermal levels). He could also show that a cell phone should not work at all (because no chemical effects or 'significant heating effects' can occur in the wires in a phone).

But, of course, the evidence is otherwise. Your cell phone still does work, and Dr. Davis does admit that thermal effects do cause health effects. The combined local effects of photons do matter, and the electrical effects and the context of the other chemical solution do matter!

And, there are certainly biologic mechanisms to consider beyond simply 'breaking bonds.' This is in part because proteins are particularly large molecules, so there may be hundreds or thousands of bonds to consider in a single molecule, and many bonds can rotate about themselves without any bonds forming or breaking. The number of folding conformations alone makes the comparison is computationally very challenging for any given molecule and is generally felt to be intractable for even a single small protein (this is known as Levinthal's paradox). This problem in general has resulted in the extensive scientific study of protein folding and protein dynamics (e.g. https://en.wikipedia.org/wiki/Protein_dynamics).

Dr. Davis describes conformational changes in channels as 'bonds being rearranged' (Tr. 4/13 at 110:20-111:3). The energy required to cause these conformational changes (e.g. some twist of the molecule) and hold the protein in a given shape therefore depends on other many external conditions involving non-covalent forces such as electrostatic forces, hydrogen bonds, Van-Der-Waals forces, and hydrophobic forces. Dr. Davis would still be correct to say that a single photon is still too weak compared with any of these forces, considered alone. However, the shape of the molecule depends on how the protein interacts with itself and the environment, and this is extremely complicated involves many kinds of 'bonds'.

So complicated in fact that the large protein molecule twisting in shape as conformation that they are generally understood to form and break spontaneously. And, instead any discrete levels of energy change, in the study of proteins it is generally considered an 'energy landscape' (e.g. https://en.wikipedia.org/wiki/Energy_landscape) where the protein changes shape in a *continuous* manner to a different shape, and at *infinitely* small levels of energy. So, Dr. Davis' comparison value – the energy delivered in a single photon - cannot be compared to any specific discrete energy that is caused a 'bond break,' because the energy level to alter a protein structure is felt to be *infinitely* small. And, the high numbers of incident low energy photons can easily affect this probability game or the energy landscape.

Dr. Davis does admit that it is possible to get a transport of an ion through a channel in a membrane, but feels this is this is only at lower frequencies because of inertia (Tr. 4/13 at 113:16-17). Dr. Davis states that at 900 megahertz a photon has no ability to change the dynamics of an ion, because of ion's inertia. (Tr. 4/13 at 112:6-8). Dr. Davis leaves out or forgets that the transients and harmonic effect the physicians expressed concern about do occur at these lower frequencies, and thus why they became relevant for this proceeding.

Also, the bursting and frequency key modulation nature can play effects here because the on/off nature can act like a lower frequency superimposed. And, again, if it is true that difference is explained entirely by the inertia effects, and all reactions must be caused by single photons then it should not be possible to have any thermal heating at 900mhz, either. Even a thermal effect still requires *some* mechanism to transfer the energy (e.g. how does it make the molecules move a bit faster and cause the thermal change).

The answer is that there are many photons involved and it is the combination of photons that work together that executes the effect! And, as Dr. Davis' 1987 paper points out the local conditions greatly matter. As a simple related analogy, understandable to a lay person (unrelated to photons or EMF per say, but to demonstrate how relatively high chemical 'bond breaking' energies can be obtained, by summing many smaller values), most children learn that table salt (NaCl) is well described to easily ionize in water (e.g. http://www.middleschoolchemistry.com/lessonplans/chapter5/lesson3). The activation energy required to break this bond is much lower than for the pure substances alone because the Sodium (Na) tends to easily part with an electron while the Chloride (Cl) tends to easily accept the electron (lowering the energy), and the hydrostatic force of several water molecules each with a polarity stabilizes the 2 now separate but charged ions. But, also because of this effect, the chemical bonds of salts in your body are breaking and reforming all the time. No single water molecule has enough energy to do this. But, several water molecules working together can. And more grossly, by changing the water concentration levels in bulk, it changes the probability of events that spontaneously occur and how much salt dissolves. This same kind of additive effect can occur with many photons striking a very large protein molecule that can twist on itself.

Next, in biology, there are several methods by which it is possible to *trigger* activity without breaking any chemical bonds because they work as catalysts for other reactions. This *sometimes* involves making chemical (as in 'covalent') bonds, or breaking them, but more typically involves making or breaking chemical bonds as a *downstream* effect. In biology this is often through complicated cascades that amplify other triggering events effects (e.g. https://en.wikipedia.org/wiki/Biochemical_cascade). For example, the electrostatic charge effects of salt described above play important roles in inducing conformational changes in large proteins - twisting them or attracting them through ionic charge effects but *without* creating or breaking any covalent bonds and in a 'energy landscape' described where other non-covalent bonds are always breaking and reforming spontaneously. These kinds of trigger events cause cascade effects to execute chemical bond breaking and resulting biologic effects at much greater scale and effect. For example, it takes very little allergen to set off an allergic reaction, and this process does not start by covalent bonds being made or broken. It typically starts by a random chance non-covalent meeting of a molecule and a receptor, or subunit proteins interacting.

This biochemical cascade is why disease plays such an important role in dosing. But, Dr. Davis seems to have no knowledge of this, and certainly makes to effort to include how it might affect his computations. This cascade effect can amplify triggering effects thousands or millions of times, and is the reason that biologic variance is so important to consider when deciding if something is 'safe'. A single genetic difference can be the difference of a peanut being safe at near infinite dose, and a peanut being a lethal weapon to trigger an anaphylactic reaction (e.g. https://www.sciencedirect.com/science/article/pii/S0091674917315749).

Radio frequencies are also well known to create local electrical currents. For example, the military has requirements about the use of cell phones and radios near explosives and rockets. The stated reason is because radio frequencies are known to create stray currents. (e.g. https://www.wbdg.org/FFC/ARMYCOE/ARMYCRIT/pam38564.pdf , page 215-216). These local current effects also occur in human cells (actually all biologic cells) because they are composed primarily of salted water that can conduct currents.

In short, and independent from the discussion above, there simply are plenty of mechanisms in biology where low energy photons can have additive effects to cause downstream bond breaking and observed effects in humans. While it is potentially reasonable to say that there is controversy over exactly which mechanistic details involved, several detailed models have been proposed and are, for example, outlined in the NTP study he

referenced (Tr. 4/13 at 38:7; https://ntp.niehs.nih.gov/ntp/about_ntp/trpanel/2018/march/tr595peerdraft.pdf at page 31). The NTP study has been discussed in prior cases (e.g. C-2015-2475023 Povacz v PECO). Dr. Martin Black has written extensively on this (https://ecfsapi.fcc.gov/file/10307262054844/3-12%20Attachment%20-%20Blank%2C%20Electromagnetic%20Biology%20%2C%202008.pdf) as it relates to DNA breakage in particular. And some scientists such as Dr. Martin Pall (who testified in C-2015-2475023 Povacz v PECO, Direct Testimony of Dr. Martin Pall on behalf of Complainant Maria Povacz at 10) believe they have worked out the exact protein involved (the voltage activated calcium channel), genetic variants, and can show exactly the regions of the protein that are so sensitive to RF (because of its charge detecting regions in this channel and the location of this region in proximity to the lipid layer of the cell wall) which of many of the related cascades are involved (associating it to both the biochemical intermediates and gross physiologic effects), and which genetic variants are involved (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3780531/, https://www.degruyter.com/view/j/reveh.2015.30.issue-2/reveh-2015-0001/reveh-2015-0001.xml, https://www.sciencedirect.com/science/article/pii/S0891061815000599#sec0015).

It's not just a few isolated studies. There are thousands of articles on this subject in both plants (http://collectiveactionquebec.com/uploads/8/0/9/7/80976394/e-rf-radiation_injures_trees_2016.pdf) and animals (e.g. https://pdfs.semanticscholar.org/4089/f82b87f3513ae3c46cf93834abfbd45fca7b.pdf)

The extensive body of this literature is why in 2011, the International Agency for Research on Cancer (IARC) classified RFR as possible human carcinogen (Group 2B).

And these are not just small trials, such as the ones mentioned by Dr. Israel. Some are very large trials (e.g The Ramazzini Institute study at (https://www.sciencedirect.com/science/article/pii/S0013935118300367). This study released January 2018 which included nearly 2500 animals, and established that the same tumor and dose dependent effects seen in the NTP study (which is also an enormous study) also occurred in the same animal and sex at a different study site and by a different study group, and also with far field exposure as opposed to near field exposure, and occur at even lower doses than the NTP study. The Ramazzini study therefore concluded to make this recommendation for the IARC to make this statement even stronger:

> "These tumors are of the same histotype of those observed in some epidemiological studies on cell phone users. These experimental studies provide sufficient evidence to call for the re-evaluation of IARC conclusions regarding the carcinogenic potential of RFR in humans."

And, there are studies done in humans. Even Dr. Davis admits there are studies showing EEG (electroencephalogram) changes at nonthermal doses using pulsed RF (Tr. 4/13 at 129:6-11), and that the Burst effects or pulsing behaves quite differently biologically than continuous RF. (Tr. 4/13 at 130:1-5). There are now dozens of these human studies could be referenced.

The point of all this referencing is not to imply that these studies all directly apply to Alexia's case or necessarily need to be quotable evidence entered in this proceeding. Alexia is not a plant, nor is she complaining of cancer (Tr. 4/13 at 38:23). The legal point is more straightforward. It should be abundantly clear that such literature exists and is quite extensive and deeply rooted. Again, this legal proceeding is simply not the place to debate or formally establish what scientists believe is the 'consensus' opinion because it could never be adequately discussed. That's what the physician experts are for. When Dr. Rea states "Well, there are literally thousands of papers now" (Tr. 4/12 at 69:16), he didn't just make this up.

But, if this subject were as simple that a well-established physics computation would prove things impossible, as Dr. Davis attempts to imply, large studies like the NTP study, Ramazzini, or COSMOS (http://www.ukcosmos.org/) would never have been funded. They were funded because, while there are still questions to answer and the issue is very difficult to study in general, reasonable biologic mechanisms are proposed, and there is much, much 'more than a scintilla' of scientific evidence that biologic effects do occur, a fair bit of epidemiology to support the ideas, and therefore there such a concern that this could be of health concern in humans in a more general sense. Depending on what expert is talking, and how much industry sponsored science is included, it does in fact, form the 'preponderance of the scientific evidence.'

And, in this case we are just concerned about an individual named Alexia – could this have occurred in her. Her doctors say, Yes. Not, just 'could have.' Beyond reasonable medical certainty, it did. So, when Dr. Davis asserts a belief to associate FCC levels with how he might state the mean 'safe' to imply '…cannot cause ANY biologic effects…' based on first principles of physics, he simply demonstrates:

a) he really does not understand how it occurs, but he isn't expected to know because he is not a biologist.
b) he is making an argument from ignorance because he doesn't *know if* it could occur, and concluding it cannot occur.
c) He is making deliberate intent to obfuscate issues.

At minimum, this needs to be accounted for when an ALJ weighs Dr. Davis' 'expert opinion'

Alternatively, if Dr. Davis does not intend to assert '…cannot cause ANY biologic effects…' in a general sense, however, then he has also has not rebutted the physicians who say they have found an exceptional individual where it DID cause biologic effects.

6.2.2.5.5 The FCC levels do not guarantee safety in all biologic situations.

Relating biologic effects to the energy levels referenced in the FCC specifications is yet another question. The meaning of 'non-thermal' in discussion of the FCC specifications is now different to mean the ability to raise gross body temperature by detectable amounts. Here, the discussions in the literature around 'non-thermal' effects do not center on 'is a non-thermal biologic effect possible' but instead focus on how relevant is that effect in humans.

Dr. Davis testified the FCC set its maximum permissible exposure limits based on scientific experiments that looked at what levels of radiofrequency exposure caused behavioral changes in animals, which were interpreted as the animals beginning to feel warm as result of the exposure and then set general public exposure safety standards at a level 50 times lower (Tr. 4/13 at 23:8-14).

He further testified that in the FCC evaluation they consider both thermal and non-thermal effects, but found *to date* there is no evidence of *powerful* biologic effects at non-thermal exposure levels (Tr. 4/13 at 23:20-24:1).

The FCC states explicitly where and how it determined the current safety levels in (https://transition.fcc.gov/Bureaus/Engineering_Technology/Orders/1996/fcc96326.pdf). This document traces reference for the relevant part of the specification Dr. Davis refers to back to the 1982 ANSI standards in (https://ieeexplore.ieee.org/document/27810/).

These are documents in the public records and ancient documents (we are certainly not legal experts here, but find that rule 803 (8) and (16) does allows exceptions to hearsay for documents more than 20 years old and available from their original sources listed above, or are matter of public records such as the FCC document). On

page 11, the FCC document describes the additional 5-fold lowering in 1992, from a 10-fold 'safety factor' originally set in the 1982 ANSI report which is presumably where Dr. Davis gets his 50-fold safety factor statements. However, Dr. Davis does not appear to know this since he didn't know that the safety levels changed in 1992 (Tr. 4/13 at 125:22-24).

Figure A1 of the 1982 ANSI paper is where the power density limit was originally set and based its decisions on references a SAR line of 0.4W/kg.

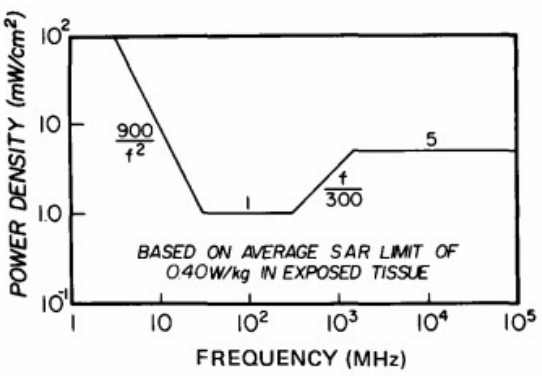

Fig A1
Radio Frequency Protection Guide for Whole-Body Exposure of Human Beings

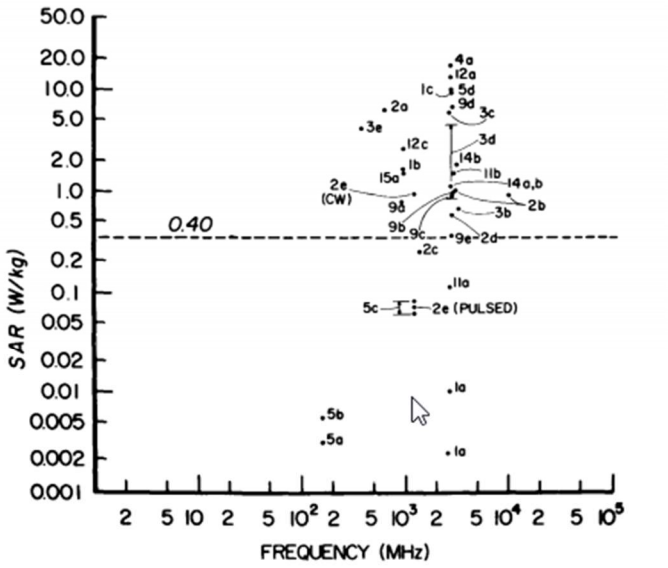

Fig A3
Whole-Body-Averaged SAR Corresponding to Biological Effects Reported in Various References of Appendix

The SAR line 0.4 W/kg comes a 10-fold reduction of the groups decision that the hazardous effects with whole body averaged SAR was above 4W/kg (page 13, last sentence before 6.6 Safety factor). The studies with effects to determine this is shown in Figure A3 on the last page and already includes the 10-fold safety factor from which Figure A1 (where the FCC value is ultimately derived). Notably Figure 3 uses a **log** scale, and there are 3 positive studies WELL below that 'safe' line.

These are the studies 1,2, and 5, which all mention calcium efflux and modulation, and because of the log scale occur at doses more than 100x lower than the 10-fold safety factor level, or more than 1000-fold lower than what the ANSI committee considered 'safe' in this small sample available back in 1982. So, even accounting for the additional 5-fold 1992 reduction, studies 1 and 5 which were all done before 1982 and still had known positive studies at levels more 10-20 times lower than the limit as it currently exists. And, this occurred even after ANSI had already excluded many other papers that were even lower because they were considered extreme examples as described on page 13 because

> *"Positive findings were claimed at much lower field strengths than employed by other investigators and because the periods of exposing animals are among the longest of any reported in the literature on microwave teratology." (emphasis added)*

ANSI explains:

> *"In addition, modulation-specific effects, such as efflux of calcium ions from brain materials [2], [5] were not considered adverse because of the inability of the subcommittee's members to relate them to human health" (page 13).*

ANSI further clarifies on page 14.

> *"6.8 Other Factors. It was recognized by the subcommittee that the specific absorption rate (SAR), which provides the basis for limiting power densities, **does not contain all of the factors that could be of importance in establishing safe limits of exposure**. First, other characteristics of an incident field such as modulation frequency and peak intensity may pose a risk to health. Again, the data base does not provide the evidence of adversity by which to recommend special provisions for modulated fields. There was an intuitive concern by some members of the subcommittee that caution should be exercised when individuals are exposed to a pulse-modulated field of high peak but low averaged density, or to a sinusoidally modulated field, when either field has a recurrence rate in the range of bioelectric rhythms. A supportable way of expressing this concern, which would be applicable to all exposed populations, could not be reached." (emphasis added)*

In other words, in 1982, the subcommittee of industry representatives at ANSI did not state that biologic effects are impossible at 'much lower levels' because they had evidence that it did exist (even at more than 100 times lower levels), even as they made their recommendations back in 1982. Instead, they stated that they didn't know of enough data in human health at the time, and there were too many factors to consider so a solution could not be reached. They argued that they did not know how to evaluate it and didn't think it to be of importance. Keep in mind also that in 1982, *no* federal limits existed, and the committee was just trying to do something reasonable and set some kind of a limit.

The 1982 document was superseded in 1991. The authors of ANSI-C95.1-1991 (https://ieeexplore.ieee.org/document/159488/), from which the FCC ultimately derived their update 5x lowering to make the 50x safety values Dr. Davis quotes from, also specifically state warnings about this in the setting of pulsed fields. For example, on page 33:

> *"Peak power limits are provided to prevent unintentionally high exposure and to preclude high SA for decreasingly short widths of RF pulses. For some time, it has been recognized that the lack of such consideration in the standard has allowed the peak power density to rise arbitrarily, as long as average power density met the standard. Furthermore, under exposure to pulsed fields it is advisable to be conservative in view of some uncertainty about the value of spatial peak SAR, which could be over twenty times the spatially-averaged SAR."*

In our case however, we have observed effects in Alexia and other evidence of effects in the literature described by Dr. Rea, Dr. McCarty, and others. And, Dr. Davis is trying to argue the observed effect *cannot* have been seen at these 'low levels' because he interprets the papers and studies that say, 'not seen' or 'we don't think it is important' to instead mean 'no effect is possible.' There simply was never any guarantee that the FCC levels would have established this level for any person regardless of their genetics, such as the unusually sensitive patients with EHS, and in fact the evidence from these reports included significant evidence of biologic effects at much, much lower levels which was ignored, not because it was bad data, but instead the fact that the committed didn't know what to do with it.

Basically, nobody really knows what 'the safe' level is as it relates to all biology, or for those with unusual sensitivity and therefore there is no international agreement on the subject (e.g. https://www.aaronia.com/basics/limits/international-exposure-limits/), and bitter disputes. There are several references of this data, and we understand that this did not make it into evidence, but Dr. Davis did confirm the major point (Tr. 4/13 at 123:3). The web reference only clarifies how extreme these differences are (e.g. in Russia the limits for 900Mhz would be 225-fold lower than ICNIRP, which itself is lower still than the FCC limit).

And, again, this only goes to support a weight of an argument that "would a reasonable scientific or medical mind (e.g. Dr. Rea or Dr. Prociuk) accept the FCC limits do not protect a person with unusual biology like Alexia." To this, the answer should be abundantly clear. There are many respected scientists making such statements, and many countries in disagreement, and the disagreement is by orders of magnitudes in the acceptable levels. Or, to quote a phrase there is "…more than a mere scintilla" of disagreement on this subject, and there is "…more than a mere scintilla" of scientific evidence that the FCC limits are not protective for ALL cases, like a relative uncommon situation such as Alexia's. Dr. Rea and Prociuk's medical decisions are entirely reasonable and consistent with this extensive body of science.

6.2.2.5.6 Dr. Davis's ignores the effect of diseased states.

Dr. Davis' computations of dosing and comparisons do not apply because the dosing of a normal subject may be significantly different from the dosing where a disease can be involved. There are many analogous situations in medicine, but because Dr. Davis is not a physician he does not have experience with medical dosing in disease states. As a simplistic example, it is not possible to define a 'safe' dose of peanuts for a normal subject and a 'safe' dose of peanuts for a person with a peanut allergy in the same way. But the same could be said for a 'safe dose' of a piece of ham in a patient with Congestive Heart Failure (CHF). The salt in the ham might have minimal impact on a patient with mild CHF, but result in a patient with severe CHF being admitted to the Intensive Care Unit (ICU). So, these dosing's simply cannot be compared in the ways that Dr. Davis attempts to. In-between are the effects of a medical disease, which Dr. Davis has no medical expertise to evaluate.

6.2.2.5.7 Dr. Davis's ignores the effect of bursting energy

It is also important also to understand and consider why Dr. Davis needs to rely on an argument that the non-thermal biologic effects do not exist. He needs this to ignore the burst effects to make the numbers look more impressive.

Dr. Davis explained that the numbers shown in PECO Exhibit CD-5 and CD-6 are calculated values (Tr. 4/13 at 86:2).

For his computations, Dr. Davis uses Mr. Prichard's description of how the AMI meter radio works (Tr. 4/12 at 154:11-14) including specification of very short (reportedly 70 millisecond) messages being sent very intermittently (reportedly every 3-4 hours). Thus, the technology has created a way to make a stronger radio look weaker because it sends stronger 'bursts' less frequently, and this can be hidden in an artifact of the way that the FCC measures by averaging. This amounts to a loop hole in the FCC regulations. Dr. Davis needs this loophole so that he can ignore burst effects and divide all his numbers by roughly 155,000 (1 transmission/70 ms * 1000ms/1s * 60s/1m * 60min/1hr * 3hr = 154,285; or computing from numbers from CD6/CD5 = 155,339 presumably from rounding error) so that they can look impressive on his graphs.

Unfortunately, cellular biology does not have these long duration timers to average the energy in the same way. Alexia's biology-based timers almost certainly work off a biochemical cascade that take time to operate but

which are *triggered* based on the single 'burst' of energy. This is likely followed by a complicated cleanup biochemical cascade that takes additional time assuming another 'burst' is not detected. The body feels the bursts and cascade events stemming from it, not the average. DNA is not involved, gross thermal effects are probably not involved, and the body simply does not have anything like a 30-minute averaging protein.

Dr. Davis admits that there is literature showing the effects of pulses (or as he describes 'bursts' are biologically important to consider admits there are other studies showing that the effects of pulsed or burst energy release is not fully explained by microwave hearing effect such as the ICNIRP quoted

> *"Compared with continuous wave radiation, pulsed microwave fields with the same average rate of energy deposition in tissues are generally more effective in producing a biologic response" (Tr. 4/13 at 145:12-17, McKnight Cross Davis Exhibit 2 at 506, under Special considerations for pulsed and amplitude-modulated waveforms)*

And, as noted above ANSI also recommends against this practice of treating burst RF as if it was a continuous wave.

And, even if the thermal effects were playing a role, his numbers would be incorrect. In the difference between CD5 and CD6 Dr. Davis appears to average over the full 3-4 hours instead of only including the relevant 30-minute period where activity occurred. And even this would change numbers even more dramatically if Alexia moved to another country where the thermal effects are averaged over 6-minutes instead of 30-minutes. The biology simply does not change if you move to another country, but with this simple correction his numbers would change by a factor of 30-fold.

Dr. Davis further makes computational errors because he relies on Mr. Prichard for data about how the AMI meters are *believed* to be working. Mr. Prichard in turn relies on assumption about how the system 'should' be working based on component specifications from the manufacturers but admits he has not tested to see if the meters perform as expected in the field (Tr. 4/12 at 246:6-10) as discussed in the next section. Mr. Bathgate has testified that assumptions about how something works in the field are not generally reliable unless tested in the field (Tr. 4/11 at 376:13-19). And, as stated above, Mr. Bathgate has further confirmed that the AMI meters in the field are apparently NOT working in the field the way that Mr. Prichard expected, whatever the reason may be. Alexia complained of this on May 2 after Mr. LaDuca measured the same problem (Tr. 4/12 at 129:9-130:13). According to Mr. Bathgate, the '70 ms' pulses appear to be much longer than 70 ms, and the periodicity of the pulses is much higher as well. PECO disputes this on theoretic grounds, but provide no actual measurements to counter.

6.2.2.5.8 Dr. Davis's ignores the alternate ways in which an AMI meter may generate EMF.

Dr. Davis makes no attempt to consider or compute alternative ways that RF or transient voltages could reach Alexia's body beyond the AMI meters radiation from its *hypothetical* antenna design and the radio generated intentional emissions. For example, his computations do not account for the fact that conducted transient emissions or secondary antenna effects (Tr. 4/11 at 389:17-390:4) which may be playing important roles because they can generate field effects at locations of the household near wiring and in much closer proximity to Alexia than the meter itself. Dr. Davis perhaps assumes those other antenna effects are small, and that the transients do not matter, but provides no evidence that they are IN FACT small or do not matter at the McKnight household, and as they relate to Alexia's unique biology. Again, to prove that the biologic effect is impossible, and that the physicians cannot possibly be correct, Dr. Davis would need to explore all possible mechanisms. In the meantime, while no other sources or explanations are known or even offered, the 'preponderance of

evidence' remains with the physician's assessments and opinions who argue that the mechanism was some form of EMF without clarity over which specific kind, and probably involving several methods simultaneously. They work on the observed effect in Alexia and identified proximal source.

For example, Alexia testified to her insomnia getting abruptly worse when the AMI Meter was installed, but dramatically improving when circuit breakers were turned off (Tr. 4/10 at 20:5-7). The wires of these circuits were only about 2 feet away underneath her side of the bed and were associated with high measured electric fields over her side of the bed (Tr. 4/10 at 39:23-25). This history suggests either secondary antenna effects and/or transients on the household wiring. This would also explain why her symptoms could occur more physically distant from the actual AMI meter such as the other end of the house but be tolerable in the yard the same distance away. Mr. Bathgate testified that the transients from many AMI meters alone were many times larger than baseline observations at our house and showed his measurements (Tr. 4/11 at 342:25; 348:14-16; 354:20; Tr. 4/12 at 20:20-25; 21:1-5; Complainant Joint Exhibit 5, page 3-4, 10).

Indeed, because Dr. Davis is comparing the apples and oranges of continuous wave RF with burst or pulse RF, the only closely relevant computation at all is CD-6, except that it still:

1) Compares to the FCC standard, which as noted above is an arbitrary number, vastly higher than limits set in other countries.
2) May include computational errors because it fails to account for the difference between actual field measurements (what the AMI meter actually does) vs values derived from an anticipated design (what the AMI meter is expected to do).
3) Does not account for effects that may be occurring via conducted emissions of transients
4) Does not account for secondary antenna effects introduced because the primary antenna of the smart meter is within the near field of other household wiring.

And, that's only IF doses could be compared to between a normal subject and a subject in a diseased state. But, diseased states cannot be compared in the same way.

6.2.2.5.9 Dr. Davis's computation techniques are questionable.

Independent of the modelling mistakes described above, Dr. Davis' methods of doing any computation need to be called to question.

For example, he testified that 9 minutes of cell phone use was equivalent to 3 months in front of an AMI meter. (Tr. 4/13 at 70:4-21; 155:24-156:3), but also testified in (Docket C-2015-2475726, REBUTTAL TESTIMONY OF DR. CHRISTOPHER DAVIS, May 20, 2016 at 18:5-12) that 7 minutes of cell phone use was equivalent to 107 years in front of an AMI meter, and also testified in (Mary Paul v PECO Docket C-2015-2475355, testimony Nov 16, 2016, Tr. 4/13 at 276:8-19) that 109 minutes of cell phone use was equivalent to 1480 years exposure of an AMI meter. In court, he states "I would never have made a statement that only 7 minutes of exposure would have amounted to that much exposure" (Tr. 4/13 at 156:10-12). But, the records are clear that he did make these statements, and under oath. These numbers are unsupported in that they do not include definition of methods and inputs so it is not clear how Dr. Davis computed these and the math cannot be independently verified, but they significantly conflict between testimonies suggesting that they may be fictitious in nature.

And, instead of attempting to do any sophisticated modelling of effects like terrain that Mr. Prichard states would be important to consider (Tr. 4/12 at 257:15-17), Dr. Davis states that his computation of exposures from TV transmitters is based on driving distances in MapQuest (Tr. 4/13 at 36:20; 163:17-25).

Also, when measured by a spectrum analyzer these TV transmissions are buried in background noise, and thus the reason TV antennae does not work at the McKnight household. This is because the signal to noise ratio is low. However, it should be noted that PECO's Tower gateways do work. This is because the signal is much greater than the background noise when the transmitter is transmitting. This quite notable on a spectrum analyzer (Tr. 4/11 at 450:20-23). This demonstrates the kind of problems that come with working strictly from computed numbers rather than doing field measurements (Tr. 4/11 at 371:15-21; 376:3-21). It's also why Alexia's body feels it differently too.

6.2.2.5.10 Dr. Davis logic is untrustworthy because he repeatedly makes appeal to ignorance arguments.

Despite Dr. Davis' concern to use overly precise scientific meanings for clarifying distinctions such as a 'pulse' vs a 'burst', Dr. Davis repeatedly slurs other meanings. For example, the FCC does not say that RF at intensities lower than would produce significant and measurable heating 'does not produce' harmful biologic effect. Instead it says that these effects are 'ambiguous and unproven' (Tr. 4/13 at 139:4, McKnight Cross Davis Exhibit 1). Dr. Davis, however states (PECO CD-3, page 3, Last sentence of first paragraph) "… the scientific consensus is that exposure to non-thermal level radio frequency fields *does not produce* any 'non-thermal effects.' (emphasis added). This is the classic Appeal to Ignorance argument. (McKnight Exhibit 6 at page 7). It confuses the meaning of 'certainty' with 'falsehood' and attempts to make a statement "I don't know if X causes Y", into the established false statement of "X does not cause Y" (McKnight Exhibit 6 at page 6).

6.2.2.5.11 Dr. Davis tends to extreme positions.

For example, he testified that it is quite safe for a young child to sleep with their head touching a smart meter (Tr. 4/13 at 98:17-20), despite the FCC stern advise against this such as in grant of equipment authorization (PECO Exhibit GP-12) that states

> *"… The transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operated in conjunction with any other antenna or transmitter except as described in this filing …"*

And in (MB-16)

> *"In accordance with the FCC requirement of human exposure to radiofrequency fields, the radiating element shall be installed such that a minimum separation distance of 20 centimeters will be maintained" (Tr. 4/13 at 102:6-10).*

The FCC included that warning for a reason.

6.2.3 A Safety issue is present because a PECO AMI Meter caused harm. We need to prevent future occurance of harm.

Because prior harm has been demonstrated by prior AMI Meter Installations, a clear and present safety consideration exists when attempting to place an AMI Meter on the McKnight residence for a 3rd time.

6.2.4 To prevent future occurrence of harm, the mechanisms that require mitigation need to be understood and addressed.

Both Dr. Lawrence McKnight and Dr. Prociuk testified that in clinical medicine, not knowing the exact mechanism of transmission does not preclude a medical determination if the proximal cause can be identified and removal of the proximal cause solves the issue. For example, Dr. Lawrence McKnight cited the well described tobacco cancer link, where the exact chemical or chemicals are not clear either (McKnight Exhibit 11).

Despite the tobacco industry's objection, without knowledge of a specific chemical, physicians still advised patients to avoid the whole cigarette. Most reasonable minds accept that, physicians were well justified in that opinion even prior to the surgeon general making statements about the safety of cigarettes or waiting for some 'consensus' to occur.

The only 2 previously verified solutions are the use of a jumper plate (this has been working for Alexia over the past year) with continued indefinite estimation, or use of an old fashion analog meter without a radio or switch mode power supply which Dr. Rea suggests he has seen work in other patients that have EHS like Alexia.

We understand that both of those solutions may be problematic for PECO to accommodate, and in the spirit of '…finding a balance among those various counter-positions' feel that if other accommodations are to be proposed then they must address the fundamental ways in which a utility meter might create EMF in the first place.

6.2.4.1 Mr. Bathgate testified to multiple reasons why an AMI meter can generate EMF unintentially, and that he measured the meters operating differently than their expected design suggests.

Mr. Bathgate is a scientific expert in the areas of electrical engineering and in the design and measurement of power systems and radio design (Tr. 4/11 at 327:12-13; 328:14-15). He has extensive experience with tracing situations where designs can create unintentional effects (Tr. 4/11 a 325:5-326:12).

Mr. Bathgate identified that a utility power meter with a switch mode power supply and a radio could generate noticeable EMF in at least 3 possible routes.

1) Through conducted transient emissions on household wiring due to a faulty design where the switch mode power supply does not have proper filtering and a ground path.
2) Through the AMI meters radio and primary antenna, which are be operating differently in the field than predicted by design.
3) Through an effect where the AMI meters primary radio antenna is too close to the household ground and wiring and therefore effectively creates a secondary antenna on the household wiring.

6.2.4.1.1 The AMI Meters that contain switch mode power supplies produce significant amounts of conducted Transients onto household wires.

Mr. Bathgate tested conducted emissions of 2 versions of the Aclara meter proposed by PECO to be installed at the McKnight household relative to a clean baseline (Tr. 4/11 at 342:25, Complainant Joint Exhibit 5 at page 10). He reported that both meters produced transients of over 300 millivolts. (Complainant Joint Exhibit 5 at page 3-4) which is more than 1,200 times the FCC class B specification for unintended conducted emissions of most household devices. (Tr. 4/11 at 348:14-16; 354:20)

Mr. Bathgate has tested other meters, including the Landis + Gyr, and noted have the same issue. (Tr. 4/11 at 366:2-4).

Mr. Bathgate testified that he measured the transients at the McKnight household, and that they were not visible using the same scale 200millivolt/div scales used in Complainant Joint Exhibit 5, page 3-4, but instead needed to change scale to 50millivolts/div see them because they were so much smaller. (Tr. 4/12 at 20:20-25; 21:1-5)

Mr. Bathgate testified that the type of equipment and conditions of the evaluation matters greatly when making such measurements because other equipment (including the oscilloscopes own the switch mode power supply)

can interfere when making measurements accurately. He therefore used a battery-operated device that does not have this issue (Tr. 4/11 at 343:21) to ensure accuracy.

Mr. Bathgate testified that the FCC class B compliance is a general requirement but does have some exceptions for public utilities. However, the exception does not apply in this case because it only applies when the device is used within the confines of their own building, not as deployed on a residence (Tr. 4/11 at 348: 20). This is a reference to 44CFR, Ch.1. §15.103 (b) which states "A digital device used exclusively as an electronic control or power system utilized by a public utility or in an industrial plant. The term public utility includes equipment only to the extent that it is in a dedicated building or large room owned or leased by the utility and does not extend to equipment installed in a subscriber's facility." Of note, the conducted emission compliance is further discussed in 44CFR, Ch.1. §15.107 which discusses class A devices in which case the AMI meter is still more than 300 times out specification.

Ironically, when exemption to FCC class B was discussed, PECO argues that "We never argued that we had a public utility exemption to this part of the regulations. It's not an argument that we ever had on the table." (Tr. 4/11 at 349:7-8).

We agree that the issue of FCC Class B compliance is out of the jurisdiction for this court, and will be reported to the FCC independently for them to sort out. In this proceeding, the issue of FCC compliance is used to make a relevant comparison point to indicate that the AMI meters with switch mode power supplies create a lot of 'dirty electricity.' These devices do not create small amounts of 'dirty electricity' they create huge amounts that swamp the effects of all other devices.

Mr. Bathgate testified that the transients introduced from the AMI Meters are very difficult to remove or mitigate because they occur on a 200 Amp Circuit (Tr. 4/11 at 361:18-21) as opposed to lower current circuits. Any simple filtering would just move this to the neutral wire and not solve the problem. (Tr. 4/11 at 361:4-5).

Mr. Bathgate testified that the AMI meters examined that use a switch mode power supply do not have the filters that are normally installed on other household appliances (Tr. 4/11 at 358:10), and further that that could not ever pass FCC Class B certification because to do so they must neutralize the transients to a ground, and not transmit this to the neutral wire. However, utility power meters do not have a method to ground (Tr. 4/11 at 362, l8-23). To rectify this, the industry would need to include a ground path on the meters which currently does not exist (Tr. 4/11 at 364:12-15).

Mr. Bathgate testified that power meters that use a capacitive power supply do not seem to have this issue (Tr. 4/11 at 366:12), and that he specifically tested one meter - the Itron C1S - which did not have the problem with conducted transients (Tr. 4/11 at 366:17). He did not test the Stratus AMI meter recently introduced by PECO in April, which reportedly uses a capacitor pump power supply.

6.2.4.1.2 AMI Meters are observed transmitting far more frequently than PECO states they should be.

Mr. Uber testified that between November 2015, and Sept 2016 PECO had not heard about any complaint about the meter (Tr. 4/12 at 119:14), however in his own exhibit (PECO Exhibit BU-1 at page 4) he shows an entry of May 2, 2016 showing "wife called regarding her meter." and later confirms this in testimony (Tr. 4/12 at 130:11-13). Alexia asked that there was never any PECO response to address this issue (Tr. 4/12 at 129:23). PECO's response is apparently the solution was to remove the meter on May 24 (Tr. 4/12 at 133:5-9). However, Mr. Uber testified that he has no record of PECO addressing this issue of May 2, and that only a check and seal record in Sept 2016 (Tr. 4/12 at 119:6-14). And, Mr. Brocato testified that he was the one to remove the meter

(Tr. 4/10 at 211:22; 212:13), and that he did this in the course of the stray voltage issue (Tr. 4/10 at 212:17-18; 214:1-3), and that from his perspective at that time there was nothing unusual about the meter (Tr. 4/10 at 213:24-25). He clearly did not remove the meter in relation to the May 2 complaint, and that complaint remains unaddressed.

The McKnight's attempted to admit a video to demonstrate the details of such a field test done by Mr. LaDuca and have Mr. Bathgate interpret this. This video would have shown the RF emissions 'peaking' the meter against a very low background noise (0.0 to 0.1 uW/m2) at the McKnight household and done at the time that the meter was on the McKnight household. However, this was blocked from being entered into evidence since Mr. Bathgate performed his own study that did not include video (Tr. 4/11 at 368-72).

Mr. Bathgate observed that FlexNet Transmissions on a house nearby the McKnight Residence occurred 4 times in 20 minutes, and lasted between 3-9 seconds each (Tr. 4/11 at 380:23-25) using a Gigahertz HF35C in the same manner as the study done by Mr. LaDuca (Tr. 4/11 at 371:4-5).

Mr. Bathgate further testified that in addition to Mr. LaDuca's method of just using the Gigahertz HF35C, he additionally confirmed that the transmissions were transmitted at 901 Mhz. (Tr. 4/11 at 450:20-23) using a Siglent spectrum analyzer.

Mr. Bathgate further testified to testing yet another neighbor's house, and getting the same results despite using a different technique suggested by PECO that was at a farther >2-meter distance (Tr. 4/12 at 23:3-17).

Mr. Bathgate testified that the FlexNet radio sends bursts of information, and that burst of information is frequently interpreted as a 'pulse' (Tr. 4/11 at 379:8-10).

6.2.4.1.3 An AMI meter can create a secondary antenna effect.

Mr. Bathgate described how the antenna of the AMI meter is in close proximity to other wires within the meter box, and this can work to create a secondary antenna effect on other household wires and ground (Tr. 4/11 at 389:17-390:4). He explained that this is the same antenna design principle used when attempting to design an antenna to have more power directed in a particular direction.

Mr. Bathgate testified that he has seen the secondary antenna effect specifically occur with other smart meters, and that removal of the smart meter radio makes the effect go away (Tr. 4/11 at 391:1-3).

Mr. Bathgate testified that simply moving the AMI meter to a pole far from the house will not prevent the secondary antenna effect (Tr. 4/11 at 400:22-25-401:1).

6.2.4.1.4 PECO has not conducted adequate field evaluations of the AMI meter infrastructure, and does not have appropriate methods to know when AMI meters are not performing according to specifications.

Mr. Bathgate testified to the importance of doing field testing because computations in an office often are inaccurate when tested in the field. (Tr. 4/11 at 376:13-19). PECO has not done these field tests except for 2 tests using the highly questionable techniques discussed below. Mr. Prichard testified that PECO did not do any field testing on the radio characteristics of the AMI meters (Tr. 4/12 at 246:6-10).

6.2.4.2 Mr. Prichard did not rebut Mr. Bathgates testimony

6.2.4.2.1 Mr. Prichard believes GP-13 represents voltage when it represents current.

Mr. Prichard has not worked on the commercial manufacture or design of components (Tr. 4/12 at 144:8). He has only hobbyist experience in components such as switch mode power supplies (Tr. 4/12 at 145:9-10).

Mr. Prichard testified that he has never measured for transients using an oscilloscope (Tr. 4/12 at 242:1-2) as Mr. Bathgate has shown.

Rather than perform a similar experiment to compare and counter Mr. Bathgate's exhibit (Complainant Joint Exhibit 5 at page 3-4). Mr. Prichard testified that PECO used a Rush Track 7000 Power Quality Meter to record data and submitted PECO Exhibit GP-13 as their rebuttal (Tr. 4/12 at 183:22-23). GP-13 was admitted by PECO as a way to demonstrate that the McKnight household actually does have transients that are high at baseline without an AMI meter, and therefore presumably any effect that an AMI meter should be small by comparison.

There are many problems with this exhibit as further described in the late filing response Judge Heep allowed. (Tr. 4/12 at 277:6-18, Late Filing Response to PECO Exhibit GP-13 available at http://www.puc.state.pa.us//pcdocs/1567065.pdf).

To start, Mr. Prichard testified that he did not know the specific details of Rush Track 7000 devices. (Tr. 4/12 at 234:3-4), and initially could not even name the device used. He further testified that he did not know how to correlate GP13 to Mr. Bathgate's measurements (Tr. 4/12 at 238:4-5), or to know if GP 13 would look different in the presence of an AMI meter instead of a plate (Tr. 4/12 at 238:23; 240:17-18). It therefore could not rebut any statement of measurements Mr. Bathgate testified to.

Most critically Mr. Prichard testified that GP-13 show the *voltage* wave form (Tr. 4/12 at 183:22-23) and testified that the waveforms in GP13 represent transients, and harmonics on the McKnight household. (Tr. 4/12 at 186:13-16), and he believed spikes represented transients (Tr. 4/12 at 234:25). However, as further described in the late filing, further analysis of GP-13 revealed in discussion with power quality experts and device representatives indicates that either PECO does not know how to use the device in question, or that they intentionally misrepresented the data coming from the device. The graph in GP-13 represents *current*, not *voltage*, and is completely uninterpretable without additional data. It makes no statement at all about voltage transients (see Late Filing to PECO exhibit GP13 at page 3-4).

So GP13 not only does nothing to rebut Mr. Bathgate's testimony, but it also casts significant doubt on the authenticity of PECO's testimony or implies that the engineers of a power company do not know how to interpret basic electrical concepts such as the distinction between voltage and current!

6.2.4.2.2 Mr. Prichard does not address the concern about conducted transients.

Mr. Prichard testified that he does not have an opinion on if FCC Class B applies. (Tr. 4/12 at 230:17-20)

6.2.4.2.3 Mr. Prichard does not rebut the concern over secondary antenna effects.

However, his GP-12 states a warning in the grant of equipment authorization.

> *"the transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be collocated or operated in conjunction with any other antenna or transmitter except as described in this filing"*

For clarity, the antenna of the AMI meter is less than 20 cm from other wires as Mr. Bathgate described, and that can act as an 'other antenna'.

6.2.4.2.4 Mr. Prichard does not rebut the concern over the meters observed transmitting too frequently, or too long.

Mr. Prichard testified that the 70-millisecond transmission time is a function of what the FlexNet radio is designed to do. He did not answer if it was ever measured, however (Tr. 4/12 at 245:14-15).

Further, he demonstrates he does not know how to interpret or use the Gigahertz HF35C. He states that this device is subject to variable background noise. This device picks up any RF signal within it's frequency range, but in Mr. Prichards description of his use he does not verify through other methods where or what the noise came from, or what the noise source is, and specifically he does not rule in or out that the noise was sourced by an AMI meter. On the other hand, Mr. Bathgate does. Mr. Bathgate uses a spectrum analyzer to check which frequency is associated, and use the directional antenna of the HF35C to identify the general direction of potential sources in that direction. In the case of the experiment he performed at the McKnight household, Mr. LaDuca had all other power to our house off, and the nearest house is 200 feet away. In the video, it is clearly evident that the background noise is during periods when the meter is not transmitting is extremely low, and part of why we wanted to show the video in the first place, however we were blocked from allowing this video from being shown (Tr. 4/11 at 368-72). This video was admitted in the Murphy v PECO case (C-2015-2475726), however.

Indeed, when Alexia reported this issue (Tr. 4/12 at 129:8-130:19), rather than come to our house and checking things for themselves, PECO's preferred response has been to simply accuse us and claim that our measurement techniques are bad. And, despite Mr. Bathgate's testimony that there is at minimum some indication of problems, PECO seems to argue that there is no way that any real-world field tests can ever be performed, and in any case, have apparently never done it except apparently in one undocumented test by Dr. Davis on some unknown house (not ours) and only to fight against us in a legal proceeding!

This is relevant to accommodations because with our concern about Alexia's safety, one issue is that we might notice an AMI meter malfunction only because of an exacerbation of Alexia's symptoms after the fact. If this occurs as we would predict, Alexia would have no way to establish if the meter was or was not causal because the malfunction could be temporary or intermittent (e.g. a programming error that occurs only under certain circumstances) while there are no audit logs to know for sure what exactly happened, and a power company ready to place the blame on the victim of its mistakes. This leaves her with no reasonable way to ensure her safety if for any reason the medical experiment fails. Again, it is unethical to prevent Alexia from exiting the experiment if she gets symptoms again per human rights guidelines.

6.2.4.2.5 Mr. Prichard confirms that the AMI meter is more powerful than the AMR series it replaced, and seems to be operating outside its FCC licensed wattage.

He testified that the AMR meter transmitted at one (1) watt (Tr. 4/12 at 150:12), while the AMI meter transmits at two (2) watts (Tr. 4/12 at 154:25) as characterized by the manufacturer (Tr. 4/12 at 157:4-5). He states directly that the AMI meter is a more powerful radio than the AMR meter (Tr. 4/12 at 211:24-25).

Mr. Prichard confirmed that because of this an AMI transmits much farther. While an AMR meters typically transmit less than half a mile. (Tr. 4/12 at 213:15-16), an AMI meter typically transmits 2-3 miles and sometimes further (Tr. 4/12 at 213:21-25). Four or Five times as far.

It is unclear while it is unclear what kind of AMR device was on the McKnight household prior to the AMI installation on Nov 30, 2015, however Mr. Prichard testified that 40% of the AMR devices were Analog designs, although they did have a Radio. (Tr. 4/12 at 149:24). It seems possible that it therefore had a different power supply design.

Interestingly, Mr. Prichard also testified that the specifications for the PECO license allow the license holder to transmit it up to 2 watts (Tr. 4/12 at 211:19-21), however he also submitted GP-12 that indicates clearly that their FCC grant of equipment license only allows for 1.2764 watts for the Stratus or 1.3212 watts for the Aclara, and only 1 watt for the L&G. So, while the device manufacturer says it works at 2 watts, this suggests that the meters may be transmitting more power than their FCC license grant allows. Nowhere does this license state an allowance of 2 watts. This again is an FCC jurisdiction issue and will be reported separately, but raises credibility questions.

6.2.4.2.6 Mr. Prichard confirmed that many of PECO accomodations are accomodations in name only.

Mr. Prichard testified that PECO's second accommodation – to have an Advanced Meter Service Provider read the meter -- is not viable because there is nobody in this market place (Tr. 4/12 at 197:4-5).

Mr. Prichard testified that PECO's third accommodation – to have the AMI installation delayed – is not viable because the deployment is complete (Tr. 4/12 at 197:21-22).

Mr. Prichard testified that PECO's sixth 'accommodation'- to design the AMI system to have less radio transmission – was not an accommodation. Instead he testified that he did not consider or make design choice to decrease RF exposure to customers (Tr. 4/12 at 200:11-14).

Mr. Prichard testified that PECO's seventh 'accommodation' – to tune down the transmissions, really isn't an accommodation because it's an automated system that works to get an 'optimal' number so that billing data can be received (Tr. 4/12 at 202:13-18). This is not a choice of the customer or a manual setting that can be set.

6.2.4.2.7 Mr Prichard inadvertently testifies that the AMI system can operate in ways not expected

Mr. Prichard testified that PECO did not do any field testing on the radio characteristics of the AMI meters (Tr. 4/12 at 246:6-10).

He did, however, testify that the AMI meters are provisioned with a tuning process where different frequency bands are tried (Tr. 4/12 at 164:9-11) and have a parameter to determine how often the meter transmits and that this parameter is set depending on how well the sent data is received. (Tr. 4/12 at 167:2-3).

He also stated that PECO AMI meters coming from the factory are designed to transmit every 90 minutes, but PECO progressively adjusts this value until they get an 'optimal number.' (Tr. 4/12 at 202:13-17).

He confirmed that AMI meter tuning is done remotely (Tr. 4/12 at 214:21-22) and is highly automated (Tr. 4/12 at 215:11-12), that issues such as Topography can affect transmissions (Tr. 4/12 at 257:15-17), and that that the tuning process could increase the transmissions if it was not performing well because the objective is so that we can produce actual bills (Tr. 4/12 at 10-18).

Mr. Prichard is critical of Mr. Bathgate's assessment of a collision network because the PECO ALOHA protocol is significantly different. However, the rest of what Mr. Prichard describes would act much the same way, except slower to affect. In a highly automated system, the gateway not receiving data regularly enough would tend to remotely increase the transmission frequency. If the meter started by transmitting every 90 minutes, instead of

a 'resend' as Mr. Bathgate describes, the collisions and topographic effects still tend to slowly increase the frequency of transmissions from a baseline of every 90 minutes, to a decreased transmission period (e.g. every 60 minutes) because the data is not getting through. Something like a topographical cause easily cause an entire set of meters to do this together, causing increasing the chance of collisions, and thus the tower gateway to send instruction to decrease the transmission period rate yet again. Verifying that these unanticipated effects are not occurring is exactly why field testing is important, and why Mr. Bathgate made his statements about the topic.

Mr. Prichard testified that anomalies in read rate or performance should be received each day (Tr. 4/12 at 217:7-12). A key word here is 'should'. It still seems to be a mystery about why this system did not appear to be triggering significant investigation daily while the AMI meter has been off the McKnight house for months, and more recently nearly a year.

Mr. Uber testified that the meter was reinstalled on or about September 7, 2016 *because* the meter was not being heard from, and as a result a check and seal was sent to verify that the meter was functioning correctly. (Tr. 4/12 at 119:9-13). Mr. Prichard testified that this was because a second meter undergoing provisioning at the McKnight residence to cause the billing system to detect a new meter and thus explaining Mr. Ubers trigger for check and seal (Tr. 4/12 at 219:18-24). However, the serial numbers of the AMI meter installed on both periods was identical according to PECO Exhibit BU-1 (page 2, entry of 11/30/2015, and page 4 entry of 9/7/2016). Thus, if there was a trigger for a check and seal, it is unclear how that would have happened. PECO explained that the AMI reporting system and PECO Workflow Management System are disconnected (Tr. 4/12 at 273:13). But, if the systems are disconnected, then there is also no way for the AMI reporting system to know automatically when there are service requests going on and therefore to ignore the daily anomalies report that must have been occurring. It would therefore seem to imply that nobody is seriously looking at these alarms, or that 'alarm fatigue' (e.g. https://www.ncbi.nlm.nih.gov/pubmed/24153215) has set in.

Mr. Prichard noted the 'tremendous variability' of the Gigahertz HF35C meter (Tr. 4/12 at 188:19), and notes specifically that it behaved 'much the same' outside the PECO AMI system (Tr. 4/12 at 189:14-16). In fact, he admits that he specifically noted that in front of a Landis + Gyr AMI meter that in some cases it pegged the meter continuously (Tr. 4/12 at 190:9-11).

What he did NOT do, however, is verify that the reason for his tests because the HF35C was reading erroneously as opposed to the Landis + Gyr AMI meter was operating erroneously. Mr. Prichard testified that he did not confirm his readings of the Gigahertz HF35C with a spectrum analyzer. (Tr. 4/12 at 242:11-14). And he testified that if a spectrum analyzer measured 901 MHz, it would be an indication of the device generating the signal (Tr. 4/12 at 243:1-3). Mr. Bathgate testified that he DID do that (Tr. 4/11 at 450:20-23).

Situations where a design does not perform as expected are classically described in the health informatics and software engineering literature including a notorious and extremely well described case of the Therac-25 where six patients were given massive overdoses of radiation in 1983. The case of the Therac-25 has become a standard teaching example on the subject in part because it was instrumental in creation and many changes of the FDA Medical Device Reporting regulations (21 CFR 803) and the safe medical devices act of 1990 (https://www.fda.gov/downloads/MedicalDevices/DeviceRegulationsGuidance/GuidanceDocuments/UCM095266.pdf). For example, consider the ancient artifact http://sunnyday.mit.edu/papers/therac.pdf at page 44, 'Causal Factors' which describes the root causes in detail. Mr. Prichard's evaluation of the AMI meters reads like

a textbook example by violating one by one of all the root causes that lead to the Therac-25 disaster. This is why Mr. Bathgate testified to the importance of field testing (Tr. 4/11 at 376:13-19).

6.2.4.3 Dr. Davis did not rebut Mr. Bathgates testimony

6.2.4.3.1 Dr. Davis did not rebut Mr. Bathgate's concern about conducted transients.

Dr. Davis argues that the FCC regulations in section 15.107 do not apply to devices operated with a license. (Tr. 4/13 at 50:19-23; 167:10-18).

Again, we view this as an FCC issue, however, we are unable to find the license exception Dr. Davis states anywhere in 15.107, and instead find only very clear references from 15.105 2 paragraphs above which references provisions of 15.103 exemptions (https://www.gpo.gov/fdsys/pkg/CFR-2002-title47-vol1/pdf/CFR-2002-title47-vol1-sec15-103.pdf) which specifically lists all the exemptions, and nowhere in this list is a provision for licensed exceptions, but also because the FCC grant certificate that PECO provided in GP-12 states the specific frequency range of the license including the frequency tolerance. Unintentional conducted emissions would fall well outside of that frequency tolerance and thus violate the license. And, that unintended effect is why the FCC class B exists at all – the unintentional conducted emissions could interfere with someone else's license.

Ironically, section 15-103 is the very exhibit blocked by Mr. Smith when he stated that "We never argued that we had a public utility exemption to this part of the regulations. It's not an argument that we ever had on the table." (Tr. 4/11 at 349:7-8).

Of relevance in this case is that Dr. Davis never addressed the primary concern of the quantifiably high observed transient values Mr. Bathgate noted, and the relation these values have to background transients measured at the McKnight household (Tr. 4/11 at 348:14-16; 354:20). This concern would exist regardless of the device having an FCC exception or not. Being 1200-fold over the specifications that similar household devices are required to meet, and at values many times higher than observed at the McKnight residence, is of relevance regardless of any legality to do so. It means simply that these devices create a LOT of the kinds of 'dirty electricity' that the McKnight's took time and effort to clean up at their household to protect Alexia (Tr. 4/10 at 19:23; 85:13-17).

Dr. Davis testified that he performed tests to measure harmonics and transients at a friend's house, and there were harmonic and transients coming from the grid through an analog meter, but that adding a smart meter *reduced* the harmonics and transients (Tr. 4/13 at 60:8-61:17). Dr. Davis testified that he measured PECO smart meters using "expensive" "high quality" equipment (Tr. 4/13 at 53:1-2), but provided almost no detail on this such as model numbers, which measurements performed, or any quantitative values. PECO refused to offer any more details or report of this, even if given chance to do this (Tr. 4/13 at 149:4-16).

This is therefore a very suspicious study in part because there are no actual values given, and the details are extremely vague. But also, it is meaningless because there is no way to compare the results to either the McKnight household or to Mr. Bathgate's tests, so it does not rebut his testimony. Dr. Davis' tests would be invalid in the first place because he stated that his friend's house does not have a clean baseline to start so it would not be able to see if there was important contribution of the AMI meter because it gets buried in other noise. The source of this noise at an old farm house could be many things likely other florescent lights, dimmer switches and other noisy devices at that house which the McKnight's took care to eliminate (Tr. 4/10 at 19:23).

The farm like setting Dr. Davis describes could also include other industrial devices like pumps which the McKnight's do not have.

The fact that Dr. Davis states that a smart meter acted as a filter to reduce transients (Tr. 4/13 at 151:19-20) is crazy. There is no way a device like this could ever clean up or dampen transients introduced from another device on a 200-amp circuit (Tr. 4/11 at 361:14-362:5). The Switch mode power supply would only add transients because it causes a deviation of the 60 Hz with a short load of the power supply turning on and off is what creates the transient. This statement means that he likely was not measuring them correctly.

PECO probably does not want to provide a written report of this precisely because they know it was a meaningless test. Again, PECO has not provided a single quantitative value of comparison in this experiment, and gives a bizarre ambiguous description of the test setup.

Mr. Bathgate, on the other hand, showed his baseline (Complainant Joint Exhibit 5 at page 10), described exactly how the test was done, instruments used and gives his values. Further, Dr. Davis testified that the single test of the farmhouse of his friend is the only field test of electrical power they have done (Tr. 4/13 at 81:2-3), and Dr. Davis admits that it is possible that a study done at another location (for example our house) it would yield different results (Tr. 4/13 at 82:3-4).

The bottom line is that this test does nothing to rebut Mr. Bathgate's testimony.

6.2.4.3.2 Dr. Davis inadvertently confirmed why PECO's concern about Mr. Bathgate's use of the Gigahertz HF35C was a non-issue.

PECO expressed concern about Mr. Bathgate's use of the Gigahertz HF35C, and quoted the instructions of the Gigahertz HF35C suggest a distance greater than 2 meters. (Tr. 4/11 at 449:15-16)

Beyond the fact that Mr. Bathgate repeated his measurement and reported that it did not matter for this purpose (Tr. 4/11 at 23:3-17). Dr. Davis explained why it did not matter.

Dr. Davis states that the near field at 900Mhz is 0.159 * 30 cm = 4.77cm (just under 2 inches), so being beyond one meter takes you outside the near field. (Tr. 4/13 at 73:20-74:2).

The purpose of the instructions is to ensure the measurement is clearly in the far field, and that the specific value is correct as might be used for formal measurement techniques where the specific quantitative result of the power density can be reproduced. However, in this case Mr. Bathgate (and in Mr. LaDuca's case) he was not doing a quantitative test to determine power density, but rather a qualitative test of a burst (yes/no is it occurring), and examining the timing associated with this. In the tests, it simply over-ranged the meter, so any quantitative aspects of a value are unknown. However, for burst timing, it does not matter (Tr. 4/12 at 22:22-23:8). The source identification is established through 2 methods – the fact that there are no other sources in the area (e.g. turn off the power inside the house), and look for explainable other nearby devices then verify a baseline in the area; and in the case of Mr. Bathgate to verify that the bursts correspond to a 901 MHz burst on the spectrum analyzer. Mr. Bathgate testified that he rechecked at 2-meters distance (Tr. 4/12 at 23:6) and it did not affect this measurement because during transmissions it 'peaks' the meter meaning roughly too high to measure.

Additionally, if this manual is to be quoted from for how to measure, it might be worthwhile for PECO to also skip over to page 26 of the same manual which states *why* to measure. Under the section "Why Measure Radio Frequency and Microwave Radiation"

> *"Literally thousands of studies (6,000 and growing) have determined that EMF is biologically harmful. Hundreds of studies show a causal link between radio frequency and microwave radiation and serious health effects."*

It might also be of relevant interest as they quote the Austrian Health Authority Building Biology recommendations, on page 21. The readings of 0.1-10 uW/m2 (microWatts, not milliwatts as the FCC) is considered 'moderately conspicuous' and 10-1000 uW/m2 is considered 'very conspicuous' and >1000 uW/m2 (the readings both Mr. Bathgate and Mr. LaDuca measured) is considered 'extremely conspicuous'

Below this table, the very strict "In Autumn 2008 the "Bund für Umwelt und Naturschutz Deutschland e.V." (BUND) (environmental NGO) recommended a limiting value of 1 µW/m² even for outdoor situations. The Landessanitätsdirektion Salzburg (Austrian health authority) proposed already in 2002 to lower the present "Salzburger Vorsorgewert" (precautionary value) to 1µW/m² for indoor situ- ations" For reference, the peak value Dr. Davis computes in CD-6 (0.016 mW/cm2) is 160,000 uW/m2.

This goes further to support the argument that when Dr. Davis makes statements that FCC limits are protective for everybody including the extremely sensitive such as Alexia, it should be apparent that there are certainly some disagreements about this, and as stated above, authorities in other countries have come to radically different conclusions, and thus a measurement tool like the HF35C exists.

6.3 Policy Issues

6.3.1 Section 1501 requires safety accomodations

66 Pa. C.S. § 1501 states that "Every public utility shall furnish … safe, and reasonable service … and shall make all such … substitutions, …to such service and facilities as shall be necessary or proper for the accommodation, … and safety of its patrons."

Product safety is not the same thing as individual safety. In most cases, product regulations are set to be less restrictive because people can choose to opt out. For example, we allow peanuts to be sold, while still allowing safety checks to occur because a person with a peanut allergy has the choice not to eat the peanut. Even for cigarettes, we allow consumers to choose. However, a mandate removes the individual insights that account for the complex and unique biology of every individual person and removes their right to choose safe alternatives. In this case, Alexia is being denied the capacity to choose safe options for her unusual condition in the sanctuary of her home.

Nothing could be more clearly a safety consideration than a case of causal harm, but there may be ambiguity over 'safe' to mean in the 'general sense' or for individuals. We argue that the verbiage 'of its patrons.' speaks to the individual nature of this. 66 Pa. C.S. § 1501 does not use the language of 'in the population' or 'in most of its patrons,' for example. A patron is an individual. Thus, not generally safe for 'most'. Safe for all individuals.

In a situation where this is mandated as PECO argues, it most certainly applies to every person who is subject to a mandate.

6.3.2 The current PECO offered accommodations **are not sufficient, and/or are unreasonable because they do not appropriately address the safety issue.**

6.3.2.1 The accommodations do not fully address the safety concerns.

Based on this understanding of the safety concern, we find PECO's accommodations for our special case inadequate and unreasonable.

PECO answers inconsistently on what accommodations they offer - sometimes indicating there is only choice of an L&G AMI meter, then an Aclara AMI meter or, then near the court date included an additional option for a Stratus AMI meter. Other times, they indicate more flavors as in discovery set I-88, or as explored to Mr. Prichard in testimony (Tr. 4/12 at 195:24 ++)

1. Installation of the meter in a meter socket that has been relocated by the customer to provide additional distance;
2. A tariff provision that allows alternative meter service providers to enter the marketplace and provide alternatives to PECO metering;
3. Delaying installation of AMI meters for such customers until the end of PECO's universal deployment timetable;
4. Installation of metering technology that does not include a ZigBee radio;
5. Initial choice of an AMI infrastructure design that has the lowest number of radio frequency transmissions among commercially available systems;
6. Reducing the number of transmissions from each AMI meter below the initial design programming.

All of these accommodations are unreasonable, and unacceptable because they do not ensure Alexia's safety or address the known ways that an AMI could conduct EMF.

Relocation of the meter to a new site (option 1) is unreasonable in part because it unreasonably expensive for the patron, and involves technical challenges in our case. The stray voltage issue required digging up our driveway to access wires. We just spent $13,000 to resurface this, and the relevant wires are buried below. Because of the location of our property lines and location of the underground wires, we would need to either dig up wires again to put the meter at the edge of our property, or require gaining an easement access from our neighbor's property to relocate the meter near the power line (the driveway of our house runs on an easement of the neighbor's property).

Option 1 is additionally unreasonable in that it effectively denies Alexia access to a large area of her property, and renders aesthetic degradations to the front yard. This does not meet the § 1501 requirement for 'reasonable.' For example, the Commission overturned the ALJ in the case of Robert Mattu. In this case the Commission argued that because of the utilities use of herbicides it

> *"… is simply not consistent with the landowner's ability to fully utilize the property," (Docket C-2016-2547322, Robert M. Mattu v West Penn Power Company, TENTATIVE OPINION AND ORDER BY THE COMMISSION @ page 7, last paragraph) (emphasis added)*

More importantly, however is that such a move does not adequately address the safety concern. If the transfer mechanism by which Alexia is harmed is exclusively based on radio frequency from the primary antenna, then the extra physical distance, in theory, should help solve the issue. However, because Mr. Bathgate identified other potential transfer mechanisms that work through conducted emissions, this accommodation does not

address this. If transients or secondary antenna issues are the transfer mechanism, then these issues are not addressed by physical distance. Without guarantee that other known factors have been addressed, this amounts to medical experimentation to see if it would work and Alexia does not want to volunteer. Therefore, it's complicated, expensive, and does not address the 'safety'.

Option 2 is a false option (Tr. 4/12 at 197:4-5). An alternative meter service is theoretical. It does not work in our case because there is no such service available in our area, and it would not be financially practical to have one if it might require running a separate power delivery from the alternate meter service provider to our house.

Option 3 is also a false option (Tr. 4/12 at 197:21-22). We have been agreeable to option 3 delay in the short term. However, per PECO, further delay of installation no longer an option. PECO does not offer this any longer, and it does not solve the longer-term problem.

Options 4-6 are mitigations to reduce the periodicity of RF transmissions. Like option 1 they help only slightly and only if the effects are from the Zigbee or Flexnet radio. These options do not eliminate or decrease the strength of the RF bursts, nor do they address the unintentional conducted emissions or secondary antenna effects. They do not satisfy the safety consideration.

Option 1, 4-6 are also insufficient because we have shown that the meters appear to be transmitting out of spec (for whatever reason) and PECO admits in I-41 that they do not measure actual RF power or harmonics, and in I-36 they state they do not log transmission events. Therefore, PECO apparently has no way to monitor and assure that that the solution is working as intended.

Any of the above options could result in a quagmire where we may end up in court yet again with further evidence of a third event of harm in Alexia. It's unclear how many events Alexia would have to document to finally ensure her safety and sanctuary, and she would suffer pain, and if arrhythmia recurs serious harm might occur.

We further find PECO's rational is weak for not working to find suitable accommodation.

We are only asking for an inexpensive meter, and a negotiated way to periodically enter a number into a computer.

The cost and impacts to a multibillion dollar company to implement an accommodation program appear by comparison minimal, and PECO has provided little or no analysis to show that the financial impacts to them are unreasonable, or explain how or where the expensive parts need to be negotiated or mitigated. In principle, a suitable accommodation could have cost less than they have already spent in litigation since they appear to litigate this so regularly (Tr. 4/10 at 219:20-21).

Their answer to discovery question I-50 indicates (Tr. 4/12 at 226:4-6) that are ways to manually enter data already. PECO argues that exception mechanisms are not sustainable, but it is unclear why a dedicated proxy entry system seems could not be built to accept feeds from a fiber or even an external vendor reading. Done well, this should look the same downstream, and affect a small area of their overall operations, much like they allow multiple meter brands today. PECO seems to argue that if the number/packet does not go through radio channel, it cannot go through at all. This is unreasonable since nothing else in networking software works like this (Tr. 4/10 at 157:9-11). Instead, for decades networks have been built on layers explicitly to abstract this detail (e.g. https://standards.iso.org/ittf/PubliclyAvailableStandards/index.html at ISO/IEC 7498-1:1994).

PECO argue deleterious effect on the grid including lack of billing data, alerts of outage, temperature, location change alerts, remote software updates. Given the low volume and distributed nature of the few people affected by EHS, these are all manageable issues. We understand they are a large company and policy issues are burdensome. However, independent of legal considerations, these problems should honestly be of trivial concern, and easily mitigated or solved. And, their larger size gives them proportionately more resources to address the issue. Temporary loss of billing data is easily addressed by estimation (provably. Our electric bills are still coming). Outage alerts can easily be detected in the vast majority of cases by houses nearby that DO have AMI meters, or perhaps even a different meter communication method. Additionally, if we have a specific outage at our house, not detected by our neighbor's houses. Or we can call it in via land line telephones. Alexia will notice because she is practically land locked at her home sanctuary anyway due to all the smart meters everywhere else she goes. Remote software updates are irrelevant to analog meters, and possible if alternate communications channels are established. Concern about meter location changes can be established by an old fashion lock, and periodic assessment that it hasn't been tampered with.

6.3.2.2 The accommodations represent a form of medical experiment.

Dr. Prociuk, Dr. Rea, and Dr. L. McKnight all testified to concern about EMF effects specifically because of the association with Alexia's EHS, and her need to avoid unnecessary EMF exposures. They have testified that an analog meter has the best characteristics for safety in her.

Dr. Rea testified that in his experience of nearly 500 cases of EHS that had smart meter associated symptoms (Tr. 4/12 at 74:2-4), analog meters are the only ones known to be tolerated (Tr. 4/12 at 76:6-17).

Mr. Bathgate testified that an analog meter has the best EMF characteristics because this meter does not have a radio to create RF and the design has no separate power supply circuitry thus creating the least amount of induced household wiring transients. It therefore has the characteristics that best match Alexia's physicians concerns.

Given this, to try another solution would be an experiment to determine if Alexia could tolerate it, and there is no evidence that show that other non analog solutions (or the current plate jumper installed at the McKnight residence today) are likely to work in patients like Alexia.

Mr. Bathgate has tested the Itron C1S which did not have the problem with conducted transients (Tr. 4/11 at 366:17), and offers hope that perhaps other meters that use capacitive power supply may have similarly good characteristics. Mr. Prichard states that the Sensus Stratus became available in April 2018 (Tr. 4/12 at 169:6-23) and that this meter does not have a switch mode power supply, but instead uses a capacitor pump power supply (Tr. 4/12 at 169:6-23), so that offers some hope of resolution. However, the Stratus AMI meter still has a FlexNet radio, and concern has been raised about both the direct and secondary antenna effects associated with its more powerful 2W output.

To determine if Alexia's symptoms were all a result of the conducted transients, and unrelated to RF from the primary antenna or via secondary antenna effects would require a test. For example, while we do know the jumper plate is working for her now, we do not know if just fixing the switch mode power supply issue will solve the problem.

Such an experiment would constitute a medical experiment on a human subject, which is generally bound to the human rights and ethical principles associated with such studies, including requirement for informed consent, and capacity to quit the experiment at any time (e.g. see the UN

https://treaties.un.org/doc/publication/unts/volume%20999/volume-999-i-14668-english.pdf, at 175, Article 7. And WHO https://cioms.ch/wp-content/uploads/2016/08/International_Ethical_Guidelines_for_Biomedical_Research_Involving_Human_Subjects.pdf).

PECO has not offered assurance that if Alexia were to participate in the experiment, that she would have adequate capacity to quit the experiment if her symptoms recurred, or even that if she felt the experiment was not working that she would even have a safe haven to revert back to a jumper plate and re-argue in court that the experiment was not working.

Additionally, PECO has not demonstrated that it has adequate infrastructure to know if the alternative meters will operate as they expect when deployed in the field.

Informed consent has not been obtained, and currently Alexia has stated she is unwilling to participate in any more medical experimentss because of these issues.

6.3.3 Act 192 allows other methods of accomodation

PECO's primary argument seems to revolve around a legal interpretation of Act 129 and that they are simply following the law of 129. PECO's legal appeal is predicated on interpretation that section 1501 does not apply and simply cannot be invoked.

We argue that it does apply, can be invoked, and should be.

6.3.3.1 Act 129 does not overrule Section 1501.

First, we argue that since section 1501 was available at the time Act 129 was written, no safety exception was needed in Act 129 because it would be redundant with section 1501 which already included that provision.

In some states, the value of the whole smart meter program has been questioned as it "…does not provide a net public benefit and does not promote the public interest" (Final Order, New Mexico Case 15-00312-UT at page 2, item 4) as New Mexico decided. But, in other states debate about medical safety have not been over if exceptions can be granted, but rather over if or how much the customer must pay for such an exception. For example, in Arizona (http://docket.images.azcc.gov/0000159381.pdf) where discussion lead to a small fee for opt out, and Maine (Maine Docket 2011-00262 Order at 59++, and 80:21) where both judges state that medical concerns are mitigated expressly because there already was an opt out. In Washington state it was recently decided to ensure that this opt out is at no charge (https://www.utc.wa.gov/_layouts/15/CasesPublicWebsite/GetDocument.ashx?docID=149&year=2018&docketNumber=180117). Several cities in California have gone further to place moratoriums on smart meters outright (e.g. http://www.codepublishing.com/CA/Sebastopol/html/Sebastopol08/Sebastopol0858.html , https://www.marincounty.org/main/smartmeters). Pennsylvania is very unusual in that it offers no provision for any opt out, and that creates a unique situation for consideration of medical safety.

So, one interpretation would be that the authors of Act 129 did anticipate medical safety considerations and felt it redundant to restate the obvious because it was already in Section 1501, therefore if a medical safety issue ever arose it would be obvious that it allowed because there is Section 1501.

6.3.3.2 Act 129 does not require the use of meters that have Switch Mode Power supplies, or even that the AMI meter use a radio.

In another interpretation we do not see that Act 129 asks specifically for radios or switch mode power supplies. Instead it defines Smart meter technology as

> *" TECHNOLOGY, INCLUDING METERING TECHNOLOGY AND NETWORK COMMUNICATIONS TECHNOLOGY CAPABLE OF BIDIRECTIONAL COMMUNICATION, THAT RECORDS ELECTRICITY USAGE ON AT LEAST AN HOURLY BASIS, INCLUDING RELATED ELECTRIC DISTRIBUTION SYSTEM UPGRADES TO ENABLE THE TECHNOLOGY. THE TECHNOLOGY SHALL PROVIDE CUSTOMERS WITH DIRECT ACCESS TO AND USE OF PRICE AND CONSUMPTION INFORMATION. THE TECHNOLOGY SHALL ALSO: (1) DIRECTLY PROVIDE CUSTOMERS WITH INFORMATION ON THEIR HOURLY CONSUMPTION. (2) ENABLE TIME-OF-USE RATES AND REAL-TIME PRICE PROGRAMS. (3) EFFECTIVELY SUPPORT THE AUTOMATIC CONTROL OF THE CUSTOMER'S ELECTRICITY CONSUMPTION BY ONE OR MORE OF THE FOLLOWING AS SELECTED BY THE CUSTOMER: (I) THE CUSTOMER; (II) THE CUSTOMER'S UTILITY; OR (III) A THIRD PARTY ENGAGED BY THE CUSTOMER OR THE CUSTOMER'S UTILITY (HB2200, page 72 (G))"*

Thus, the choice to use the specific meters that PECO offers appears to be an implementation decision to use the FlexNet radio which is not required by law.

Other options are also required by PECO's Tarrif which states

> *"If a customer for whom the Company is providing either metering or meter reading wishes to replace it's billing metering equipment, to the extent technically possilble, the Complany may offer, provide and support support a selection of qualified meters and may perform installation within a reasonable amount of time and at the expense of the customer. " (https://www.peco.com/SiteCollectionDocuments/CurrentElecTariff.pdf Tariff Electric Pa. P.U.C. No. 5, Issued May 31, 2018, at Section 14.3)(emphasis added)*

Clearly such meters should be technically possible. For example, other states and regions such as Chattanooga, Tennessee have used fiber optics for example (e.g. https://dash.harvard.edu/handle/1/30201056), and we already have Verizon FIOS located nearby, so it would appear that working with other service providers could clearly be done primarily through contract negotiation rather than direct infrastructure costs to run the fiber. We are also willing to working through other alternatives such as http://utilitymeterreader.com/ a company that can do things like setup a camera to take regular pictures and convert to number entry if that could help.

These should be be investigated and tested, but in theory should eliminate the known safety concerns, and if these seem more viable than a medical safety opt out via interpretation of conflict between Act 129 and 66 Pa. C.S. § 1501.

6.3.3.3 The PUC has the legal authority to interpret exceptional cases and conflicts between Statutes.

In the alternative, the authors of Act 129 did not anticipate a medical safety consideration and unintentionally created a legislative conflict. In this case it would be in the hands of the PUC to resolve the conflict and interpret this, however it's hard to understand how such a PUC resolution would conclude that the stated benefits of Act 129 could ever be seen as a higher value or priority than keeping a person from being inflicted to undergo intentional and ongoing pain and suffering.

Further, we find specifically that PECO's interpretation of Act 129 to be problematic because they seem to imply that it specifically requires the use of RF communication and unfiltered switch mode power supplies, and therefore gives them grounds that 66 Pa. C.S. § 1501 considerations for safe and reasonable accommodation can be ignored, where Act 129 would amount to an unprecedented mandated exposure to a vulnerable subpopulation.

We find no legal grouds to state that 66 Pa. C.S. § 1501 can be ignored because Act 129 was inacted.

But the PUC has authority to rule through at least:

1) Via interpretation of implicit safety exception because 66 Pa. C.S. § 1501 pre-existed.
2) Via assurance that what ever meter is used, that medical safety is achieved (e.g. require alternatives to RF such as fiberoptics, and power supplies with low conducted transients).
3) Via petition for relief in exceptional cases.

6.4 CONCLUSION

The PUC should rule to allow a safe and reasonable medical exception to the AMI meter program by providing an analog alternative for those unusual cases of Electrical Hypersensitivity, like Alexia, who can document a medical need by note from a licensed physician.

Our preferred solution - a plain old fashion analog meter - one that does not have any SMPS and has much better risk/benefit ratio than any option PECO has listed. This solution eliminates the RF transmissions altogether, and removes all issues identified by Mr. Bathgate, and all the physicians.

The analog solution also reduces or removes PECO's future legal liability to ensure that it has provided individual level safety considerations for the electrically sensitive. PECO seems ill prepared to accept this consideration because it doesn't have ways to examine patients, nor verify that devices are operating within acceptable ranges. This solution avoids all the back and forth of attempting to prove harm beyond a shadow of doubt that may occur if Alexia were to have any recurrent symptoms upon installation of the meter option choices PECO provides, or if the experiment has succeeded.

We are not asking to have every smart meter removed. Only the ones where a physician has signed off on medical need. We do not think that medical safety considerations should entail extra fees. However, we are personally willing to accept a small ('reasonable') service fee to accommodate the additional manpower required for PECO to read the meter and we are open to ideas on how get the data off the meter as efficiently validly, and securely as possible.

We don't intend on infringing on PECO's right to install and maintain the meter, or ensure that it isn't tampered with. We want accurate readings as much as they do. Ironically just before the smart meter issues we just installed a $30,000 geothermal system to reduce our electric bills, and so we'd like to see that it's saving us money. We have not been able to do that because of the continued estimation.

We believe that this decision has minimal impact on PECO because it involves a relatively tiny number of their customers. Such accommodation should not mean that PECO needs to entirely change their grid. It does add an exception method, but these kind of exception methods are common in nearly every industry.

But while it has minor impact to PECO, it has huge impact for the people like Alexia who need that extra 'safety valve' - the choice to not eat the metaphoric peanut. For these patients, it means a forced move to another state or living in chronic misery.

Dr. L. McKnight clarified that in the complaint it is up to Alexia, the patient, to make the decision to volunteer for alternative meters accommodations that are not known to work for her (Tr. 4/10 at 201: 4). Therefore, Alexia is the one to make the decision if accommodations are sufficient, unless proven solutions are offered.

7 PROPOSED CONCLUSIONS OF LAW

Pennsylvania law requires PECO as an electric utility to provide service that is safe and reasonable. 66 PA C.S. § 1501.

The Commission is authorized to enforce 66 Pa. C.S. § 1501.

Nothing in Act 129 implies that safety considerations under 66 Pa. C.S. § 1501 can be ignored.

Complainants have borne the burden of proof that the PECO AMI meter caused Harm in Alexia McKnight on 2 prior periods, and as such this represents unsafe and unreasonable service in violation of 66 Pa. C.S. § 1501, and presents a significant risk for her future safety.

In meeting their legal burden of proof, complainants are not required to establish that treating physicians acting in expert opinion roles have first established that their opinions or treatment recommendations have been validated against a mythical medical and scientific consensus. Instead these experts should be expected to provide rational for their recommendations or opinions with 'substantial evidence' that is consistent with what is known in science.

Neither a utility company nor the Commission has authority nor mechanism to provide medical evaluations. They are not equipped to regulate medical treatments to determine if disease affects individual patient safety considerations.

A treating physician with an active medical license who writes a letter including evidence of a medical examination and explanation of a medical safety need for their patient is sufficient evidence to document that a patient has a medical reason to invoke a medical safety exception under Pa. C.S. § 1501.

If and where a utility chooses to use meters that use a switch mode power supply and/or a radio, they should also provide an approved 'low EMF' option that does not have these so that physicians may order for special patient that have EHS.

8 PROPOSED ORDERING PARAGRAPHS

For the reasons set forth above, complainants Alexia McKnight, DVM, and Lawrence McKnight, MD ask the Commission to issue an order in this proceeding that states:

1. That the Commission requires and directs PECO to provide accommodations for Alexia McKnight pursuant to 66 Pa. C.S. § 1501;

2. That such accommodation means that PECO shall provide electrical service to the McKnight residence without requiring the installation of any device that has an operational radio or switch mode power supply.

Signature Page

Alexia Lawrence McKnight, DVM

Lawrence Kenneth McKnight, MD