BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Cynthia Randall and Paul Albrecht	:	
	:	Docket No. C-2016-2537666
v.	:	
PECO Energy Company	:	

ANSWER OF COMPLAINANTS TO RESPONDENT'S REQUEST FOR ORAL DEPOSITION

Pursuant to Section 5.103(c) of the Commission's regulations, 52 Pa. Code §5.103(c), Complainants Cynthia Randall and Paul Albrecht ("Complainants"), hereby submit their Answer to the Motion of PECO Energy Company ("PECO" or "Respondent") in the form of a Request for Oral Deposition of Dr. Andrew A. Marino. In support of their Answer, Complainants respectfully submit the following.

I. INTRODUCTION

On August 5, 2016, Respondent filed its Request for Oral Deposition of Dr. Andrew A. Marino ("Motion"). In its Motion, Respondent claims that an oral deposition of Complainants' expert is appropriate because of the complexity of the issues in this matter. *See* Motion ¶ 7 at 2 ("In the context of this type of scientific complexity, a deposition provides an extremely useful opportunity for the expert to clarify the scope and basis of opinions specifically relevant to the claims in the instant case.")

Complainants respectfully submit that granting Respondent's request for a deposition of Dr. Marino is not warranted or appropriate as it would create an undue burden on Complainants due to the costs and expenses involved in taking a deposition of Dr. Marino as Respondent

suggests. This case has been and continues to be extremely costly for the Complainants, requiring the services of two law firms and the cost of Dr. Marion as an expert witness. Even if these costs are shard with other litigants, they still amount to many thousands of dollars. Requiring Dr. Marino to be deposed in this case for 8 hours or even half that time will impose enormous costs on Complainants, including Dr. Marino's fees ($250 an hour), travel costs, and the cost of having counsel prepare the witness to testify and be present at the deposition. The total cost to Complainants could easily exceed $10,000.00.

The Court never need reach the issue of costs, however, because Respondent has not met the threshold requirement of showing cause under Pa. R.C.P. 4003.5(a)(2). Respondent has not identified *any* issues requiring clarification at a deposition.

Rule 4003.5(a)(2) incorporate a good cause standard. Little has been written by courts on this subject. The only case we could locate specifically on this issue recognized that cause requires a balancing of the need for the deposition to avoid trial surprise against the cost. *Monteiro v. Dow Chem.*, 1989 Phila. Cty. Rptr. LEXIS 23 *24 (Phil. C.C.P. 1989) ("The [Pennsylvania Supreme Court in enacting Rule 4003.5(a)(2)] seems to be telling us to use our discretion in a way that maintains a 'balance' between trial surprise which is underserved and the cost of communicating with experts which is usually substantial.") (copy attached as Exhibit 1).

Here the balancing weighs heavily against the deposition. PECO has identified no specific need for the deposition and the cost to the Complainants would be high. Moreover, if PECO has questions about Dr. Marino's report, it can raise them with Complainants' counsel, and they will endeavor to respond timely in advance of the hearing. For these reasons, Complainants respectfully request that the Commission deny PECO's request to depose Dr. Marino.

II. ANSWER TO MOTION

1. Admitted.

2. Admitted. By way of further answer, Dr. Marino's expert report was provided to Respondent on August 8, 2016 as scheduled.

3. Admitted.

4. Denied as stated. By way of further answer, the current schedule affords the parties an opportunity to propound multiple sets of interrogatories or other discovery. It is not necessary or required for either party to wait for answers to one set of interrogatories before propounding subsequent sets of interrogatories.

5. Denied. As set forth in Respondent's own Motion to Compel, counsel for Complainants attempted to contact counsel for Respondent to discuss discovery and scheduling issues.

6. Admitted in part, denied in part. It is admitted that Dr. Marino has not appeared in other smart meter cases pending before the Commission. It is denied that PECO does not have access to materials in other matters on which to base its preparation in this case. Dr. Marino has testified in the past in cases where Respondent's counsel Thomas Watson was involved and actually cross examined Dr. Marino in the past. Dr. Marino also testified in a case involving PECO in federal district court in Philadelphia. See Goadby v. Philadelphia Electric Company, 504 F. Supp. 812, 816 (E.D. Pa. 1980) ("This Court finds Dr. Marino's opinions and hypotheses persuasive and credible.") Further Dr. Marino has a website (http://andrewamarino.com/) that contains voluminous information relevant to his opinions in this case. PECO has ample ground based on the report alone to understand Dr. Marino's testimony, and the website and other materials available to PECO are more than enough for it to prepare to examine Dr. Marino at

trial. If there are any specific issues requiring more information, Respondent can ask Complainants' through their counsel and they will work with Respondent to provide the information as appropriate.

7. Admitted in part, denied in part. The first sentence is admitted. The second sentence is denied as vague and ambiguous. The third and fourth sentences are denied on the grounds that no response is required.

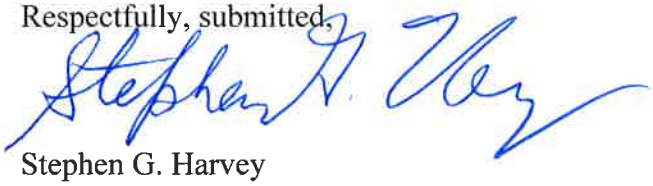
8. Admitted in part, denied in part. It is admitted that the issues in this case and Dr. Marino's testimony present complex scientific information for the Commission's consideration. It is denied that an oral deposition is necessary or appropriate for Dr. Marino to clarify his positions in this case.

9. Denied. Paragraph 8 of the Motion is a request for relief to which no answer is required. To the extent that Paragraph 8 contains factual allegations, the same are denied.

III. CONCLUSION

Based on the foregoing, Complainants Cynthia Randall and Paul Albrecht respectfully request that PECO's Motion requesting an oral deposition of Dr. Marino be denied and the requested relief rejected. Complainant respectfully requests that this matter be allowed to proceed to as set forth in the Prehearing Order in this matter.

Respectfully, submitted,



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CERTIFICATE OF SERVICE

I hereby certify that this day I served a copy of the foregoing answer upon the persons listed below in the manner indicated in accordance with the requirements of 52 Pa. Code Section 1.54.

Via Electronic Mail

Hon. Darlene Heep
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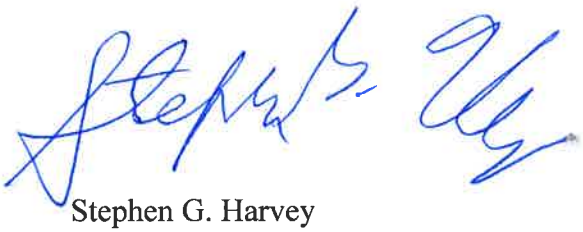
Date: August 10, 2016



Stephen G. Harvey

Date: August 10, 2016 Counsel for Complainants

Exhibit 1

Monteiro v. Dow Chem.

Common Pleas Court of Philadelphia County, Pennsylvania

June 12, 1989

No. 8212-3869

Reporter
19 Phila. 221; 1989 Phila. Cty. Rptr. LEXIS 23; 1989 WL 817119

Monteiro, et ux. v. Dow Chemical, et al.

Core Terms

discovery, grounds, ***expert*** witness, parties, ***expert*** opinion, interrogatories, ***cause*** shown, lawyers, trial judge, cases, supplemental, undisclosed, circular, judicial discretion, implicates, ***deposition***, authorize, expenses, motions, designated ***expert***, decisions, questions, answered, surprise, ***expert*** testimony, articulated, opponent's, ambiguity, depose, matter of right

Case Summary

Procedural Posture

Defendant chemical manufacturer sought a court order authorizing a ***deposition*** of plaintiff injured party's designated expert witness on the grounds that the report summarizing the ***expert***'s opinion violated the requirements of *Pa. R. Civ. P. 4003.5(a)(1)(b)* and that circular, ambiguous grounds in the report constituted "***cause*** shown" authorizing supplemental discovery from the designated expert witness pursuant to *Pa. R. Civ. P. 4003.5(a)(2)*.

Overview

The injured party supplied a written report pursuant to *Rule 4003.5(a)(1)(b)* indicating that his designated expert, a medical college professor, would testify that the injured party passed out at the wheel of his car because he was intoxicated by Tetrachloroethylene (Perk) vapors that he was exposed to as a dry cleaning worker. The court determined that *Rule 4003.5(a)(1)(b)* was satisfied when the expert provided some grounds for his opinion and that the rule did not authorize the court to make a pretrial ruling respecting the "sufficiency" of the grounds articulated for the expert's opinion. The court determined that *Rule 4003.5(a)(2)* allowed the court to order additional discovery in its discretion for "cause shown" to resolve an ambiguity in the summary. However, the court concluded that the defense could propound contention interrogatories that would give the injured party an opportunity to "cure" any deficiencies in his expert's report. If an important ambiguity lingered after the interrogatories were answered, the injured party could not argue that his expert should be spared from supplemental discovery.

Outcome

The court denied the chemical manufacturer's motion for leave to depose the injured party's expert witness without prejudice.

LexisNexis® Headnotes

Civil Procedure > Pleading & Practice > Pleadings > Answers

Civil Procedure > ... > Discovery > Methods of Discovery > General Overview

Civil Procedure > ... > Discovery > Methods of Discovery > Expert Witness Discovery

Civil Procedure > ... > Methods of Discovery > Interrogatories > General Overview

Civil Procedure > ... > Methods of Discovery > Interrogatories > Format & Number of Interrogatories

Evidence > ... > Testimony > Expert Witnesses > General Overview

HN1 A party may through interrogatories require the other party to have each expert so identified by him state the substance of the facts and opinions to which the expert is expected to testify and a summary of the grounds for each opinion. The party answering the interrogatories may file as his answer a report of the expert or have the interrogatories answered by his expert. The answer or separate report shall be signed by the expert. *Pa. R. Civ. P. 4003.5(a)(1)(b)*.

Civil Procedure > ... > Discovery > Methods of Discovery > General Overview

Civil Procedure > ... > Discovery > Methods of Discovery > Expert Witness Discovery

Evidence > ... > Testimony > Expert Witnesses > General Overview

HN2 Upon cause shown, the court may order further discovery from a party's designated expert by other means, subject to such restrictions as to scope and such provisions concerning fees and expenses as the court may deem appropriate. *Pa. R. Civ. P. 4003.5(a)(2)*.

Headnotes/Syllabus

Headnotes

[1]** Civil Procedure -- Discovery -- Sufficiency of Grounds for Expert Opinion -- *Pa.R.C.P. 4003.5* -- Supplemental Discovery From Experts -- Meaning of "Cause Shown" in *Pa.R.C.P. 4003.5*

Syllabus

(1) The quantum of disclosure required by *Pa. R.C.P. 4003.5(a)(1)(b)* is determined entirely by the self-interest of a party that answers expert witness interrogatories, i.e., a party that fails to include all of the grounds for an expert opinion may be barred from offering "new" grounds at trial by reason of *Rule 4003.5(c)*

(2) *Pa. R.C.P. 4003.5(c)* is very explicit respecting the duty of a trial judge to enforce *Rule 4003.5(a)(1)(b)*, but it supplies no standard which enables the Court to make a pretrial ruling respecting the "sufficiency" of the grounds articulated for an expert's opinion

(3) *Pa. R.C.P. 4003.5(a)(2)* establishes a "process" for parties who want supplemental discovery from their opponent's experts. This process implicates persuading a judge, and the rule explains that a judge may not grant this sort of request except "upon cause shown."

(4) *Pa. R.C.P. 4003.5* is available to parties who want to know what experts their opponents intend to call at trial, and what those experts are going to **[**2]** say

(5) *Pa. R.C.P. 4003.5* represents a compromise between a full disclosure practice respecting expert witnesses and the no disclosure practice which existed when this rule was first announced in that it authorizes *some* discovery from expert witnesses as a matter of right

(6) The "cause shown" requirement of *Rule 4003.5(a)(2)* is a rubric for judicial discretion. The Supreme Court seems to be telling the trial court to use its discretion in a way that maintains a "balance" between trial surprise which is undeserved and the cost of communicating with experts which is usually substantial

(7) This Court is reluctant to volunteer a rule of decision that defines "cause shown" for all cases. A rule of decision that is broad enough to encompass all "cause shown" motions is likely to have the practical effect of authorizing supplemental discovery almost as a matter of right

(8) In cases which implicate "circular" or possibly "undisclosed" grounds for an expert's opinion, this Court usually denies "cause shown" motions *unless* a moving party first offers an opposing party an opportunity to "cure" any deficiencies in his or her expert's report. The Court almost always requires moving **[**3]** parties to ask opposing parties "a few more questions" before coming to court.

Counsel: *Myles Glasgow,* Esquire, for Plaintiff

Dean F. Murtagh, Esquire, for Defendant

Judges: AVELLINO, *J.*

Opinion by: AVELLINO

Opinion

[*222] OPINION AND ORDER

Dow Chemical, U.S.A. "Dow" manufactures tetrachloroethylene which is used for a variety of commercial and industrial purposes. One of these is to dry clean clothing. **[*223]** For this purpose tetrachloroethylene is mixed with other materials and is known as "Perk."

Perk has a narcotic effect upon human behavior. For this and other reasons, OSHA maintains safety standards respecting its use in dry cleaning workplaces. These standards relate largely to proper ventilation, and are designed to avoid the risk that a worker will become involuntarily intoxicated by inhaling the vapors that occur during dry cleaning when heat is applied to a garment that is treated with Perk.

The plaintiff, Monteiro, is employed as a dry cleaning worker. On December 19, 1980, he became disoriented, and decided to leave work early. While driving home, he passed out at the wheel of his car. The car struck a tree, and Monteiro suffered multiple injuries including fractures of his **[**4]** nose, arm and several ribs.

Monteiro has sued Dow. He claims, in substance, that Perk is an unreasonably dangerous product. He alleges that he fell asleep while driving because he inhaled Perk vapors while he

was working.

Everyone associated with this litigation seems to agree that Monteiro's claim will fail unless he can offer expert testimony which at least "links" Perk vapors to his stupor and subsequent accident. To put this differently, dry cleaning workers are not running into trees on a sufficiently regular basis for any judge to take judicial notice of the narcotic effects of Perk.

In the course of routine discovery, Monteiro identified G. John DiGregorio, M.D., Ph.D. as an expert witness whom he will likely call at trial. Dr. DiGregorio is a professor at a nearby medical college. He was specially retained for the purpose of this litigation ostensibly to tell the jury about Perk. [1] In lieu of having Dr. DiGregorio answer Dow's expert witness interrogatories, Monteiro opted to supply a **[*224]** written report. [2] The report is brief -- 217 words -- but it plainly states the facts and the only opinion to which Dr. DiGregorio is expected to testify, namely, that Monteiro **[**5]** passed out at the wheel of his car because he was intoxicated by Perk vapors. Moreover, the report also supplies a summary of the grounds for this expert's opinion.

Dow insists that Dr. DiGregorio's report is hopelessly vague largely because it fails to address a number of questions which Dow thinks are very important. In one breath, Dow argues that the "grounds" which Dr. DiGregorio articulates cannot possibly support his opinion. In the next breath, Dow argues that the report may not include all of the grounds for Dr. DiGregorio's opinion. Therefore, Dow concludes, the report violates the requirements of *Rule 4003.5(a)(1)(b)*. [3] From this conclusion, Dow makes a leap of faith and proclaims that it has established "cause shown," which, in turn, authorizes us to order supplemental discovery from Dr. DiGregorio. [4] In brief, Dow wants our permission to depose Dr. DiGregorio.

[6]** This discovery dispute implicates two closely related questions which cause entirely too much confusion among practicing members of the Bar. These questions are (1) When is a "summary of the grounds" for an expert's opinion sufficient to pass discovery muster; and (2) What "cause" **[*225]** needs to be "shown" to animate a court to authorize additional discovery from a party's designated expert. [5]

I

Answering the first question is easy: As long as an expert articulates "some" or "any" grounds for his or her opinion, *Rule 4003.5(a)(1)(b)* is satisfied. In this respect, Dow has confused a demanding *scientific* standard with a modest *legal* standard.

Many parties make **[**7]** the same mistake. Lawyers frequently come to discovery court waving an expert report that they just received from opposing counsel. They usually tell us: (1) that the grounds for the expert's opinion are ambiguous ("circular grounds"); and/or (2) that there may be other grounds that will surface for the *first* time at trial ("undisclosed grounds").

These lawyers often hand us lengthy reports on obtuse subjects which are only interesting to them and their clients. They seem to expect us to wade through these reports like some super scientist, and come out declaring whether or not the expert's grounds support the expert's opinion, or whether or not the expert may have other or "undisclosed" reasons for the opinions offered.

We decline to perform these exercises, largely because we don't know how. For example, most of the reports that we see are signed by scientists, and what they say is almost always beyond our ken. The grounds supplied may or may not support the opinion offered. Frankly, we have no way of knowing one way or the other.

[*226] More importantly, nothing in *Rule 4003.5* tells us

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[1] Dr. DiGregorio did not treat Monteiro after the accident. For an explanation of his legal status, *see infra* n.5.

[2] *See Pa. R.C.P. 4003.5(a)(1)(b)* (authorizing this style of answer to expert witness interrogatories).

[3] ***HN1*** *Pa. R.C.P. 4003* 5(a)(1):

"A party may through interrogatories require

(a) . . .

(b) the other party to *have each expert* so identified by him *state* the substance of the facts and opinions to which the expert is expected to testify and *a summary of the grounds for each opinion.* The party answering the interrogatories may file as his answer a report of the expert or have the interrogatories answered by his expert. The answer or separate report shall be signed by the expert." (Emphasis supplied.)

[4] *See Pa. R.C.P. 4003.5(a)(2)*. The text of this rule is set forth *infra* n.17.

[5] As used hereafter, the terms "expert" or "designated expert" are synonymous, and describe the curious jural person contemplated by *Pa. R.C.P. 4003.5*. Speaking broadly, individuals of this sort have no connection with a litigation unless or until they are consulted by a party that is seeking assistance with a litigation strategy. For a general description of these persons, *see* the Explanatory Note to *Rule 4003.5*, as well as *Neal v. Lu, 530 A.2d 103 (Pa.Super. 1987)*.

how to perform these inquiries. True, Rule 4003.5(a)(1)(b) envisions an expert [**8] report that includes a summary of the grounds for each of the expert's opinions. It is plausible, perhaps, to view this rule as including a tacit command, *e.g.*, to supply a "full and complete", summary of the grounds for each opinion. [6]

The difficulty with this view is not so much that it is wrong, as that it is shortsighted. The quantum of disclosure required by Rule 4003.5(a)(1)(b) is determined entirely by the self-interest of a party that answers expert witness interrogatories, *i.e.*, a party that fails to include all of the grounds for an expert opinion *may be barred* from offering "new" grounds at trial by reason of Rule 4003.5(c). [7]

To put this differently, Rule 4003.5(c) is [**9] very explicit respecting the duty of a *trial judge* to enforce Rule 4003.5(a)(1)(b), but it supplies no standard which enables us to make a pretrial ruling respecting the "sufficiency" of the grounds articulated for an expert's opinion.

Speaking broadly, trial judges supervise live combat between warring parties. These parties often rely upon the testimony of expert witnesses. During their testimony, experts are sometimes interrupted by *objections* that argue that the expert's testimony is "*inconsistent with* or . . . *beyond the fair scope* of his testimony in the discovery proceedings as set forth in his deposition, answer to an interrogatory, separate report, or supplement thereto." ("four corners") [8]

These objections require a trial judge to conduct a brief inquiry and then make a ruling. This inquiry can be a [*227] nuisance, but it is the sort of inquiry that trial judges conduct all the time. It focuses upon "inconsistency" and "fair scope." It does not require a trial judge to pretend that he or she is a scientist, and to pass upon the *validity* of the opinion which is being offered.

Conversely, Dow's pretrial [**10] motion is asking us to conduct a *scientific inquiry* for which we have no training. For example, it only takes a glance to see that Dr. DiGregorio has articulated "some grounds" for his opinion. He is a college professor and he seems to think that the grounds set forth in his report are sufficient to warrant an opinion that can be stated with scientific certainty. Another scientist might disagree, but it is impossible for a judge to say one way or the other.

In brief, Rule 4003.5 supplies no standard that allows us to measure the "sufficiency" of the grounds for an expert's opinion. A dictum in a recent Superior Court decision suggests that a party is entitled to a "synopsis" of an expert's trial testimony. [9] That puts the question nicely but, in fairness, it also begs it.

Rule 4003.5(a)(1)(b) only requires a party to have his or her expert state *"a summary"* of the grounds for each opinion. If an expert report includes "no grounds," we could, perhaps, strike such an answer to expert witness interrogatories. In fairness, we have never seen an expert report that offered "no grounds" [**11] for an opinion, and we have seen countless reports in the course of deciding thousands of discovery disputes. As a practical matter, parties seem to recognize that a failure to include "some" grounds for an expert's opinion implicates an important trial risk, *e.g.*, a trial judge may use Rule 4003.5(c) to bar the expert's opinion from the case. To put this differently, without "grounds," an opinion begins to resemble an impermissible "guess."

Nevertheless, "circular" or "undisclosed" grounds for an expert's opinion are a pervasive problem. They are a major [*228] obstacle on the road to "the just, speedy and inexpensive determination of [civil litigation]." [10] In a nutshell, they are a nuisance for judges and lawyers alike. "Circular" or possibly "undisclosed" grounds annoy us, but they occasion larger problems for trial judges. As we explained, trial courts are frequently required to rule on objections that argue that an expert is testifying beyond the "four corners" of his or her report. [11] This can be a mind-numbing exercise for a trial judge if an expert's report is "circular." [12] Moreover, lawyers don't want to be "surprised"

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[6] This assumes, of course, that a moving party has prepared careful expert witness interrogatories. *See e.g.*, Explanatory Note No. 6 to Rule 4003.5 (explaining why an inquirer is well-advised to track the language of Rule 4003.5(a) when drafting expert witness interrogatories).

[7] *See e.g.*, Augustine v. Delgado, 481 A.2d 319 (Pa.Super. 1984) (affirming a trial judge who said that an expert's testimony did not implicate any trial "surprises").

[8] *See* Pa. R.C.P. 4003.5(c).

[9] *See* Neal, 530 A.2d 103 at 107-08 (Pa.Super. 1987).

[10] *See* Pa. R.C.P. 126 (fixing these goals for the Rules promulgated by the Supreme Court).

[11] *See* Pa. R.C.P. 4003.5(c) (ostensibly barring an expert from offering testimony beyond the "four corners" of the expert's report).

[12] *See e.g.*, Mecca v. Lukasik, 530 A.2d 1334 (Pa.Super. 1987) (affirming a trial court ruling which allowed expert testimony respecting "grounds" for an opinion that were not explicitly stated in the expert's report, but which were in the report by way of

at trial, and, frankly, a careful **[**12]** lawyer has a right to avoid this risk. [13]

Unfortunately, very few lawyers know how to cope with "circular" or "undisclosed" grounds for an expert's opinion. Most are still trying to solve this problem in the wrong way. After showing us an expert's report, many lawyers make the sort of argument we heard in this case. They usually conclude by asking that we order their opponent to make a "full and complete" **[**13]** answer to their expert witness interrogatories. We decline these requests, largely because every report they ever show us includes "some" grounds for the expert's opinion. Hence, their opponent's discovery response is always "sufficient."

On the other hand, a few lawyers know better. They never ask us to play scientist. Whenever they are confronted with "circular" or "undisclosed" grounds for an expert's opinion, they ask opposing *parties* "more questions." These **[*229]** lawyers know a practice secret: *Discovery motions are a poor substitute for discovery tools.* [14]

For example, requests for admissions are available to isolate and chain a party to the only "grounds" which are offered in an expert's report. If requests of this kind are "admitted," a moving party can hardly insist that there may be other or "undisclosed" grounds **[**14]** for an expert's opinion. Conversely, if this sort of request is "denied," it is difficult to imagine anyone complaining if we subsequently grant a motion that allows supplemental discovery from the denying party's expert. [15]

Meanwhile, contention interrogatories may be useful whenever a party is confronted with ambiguous or "circular" grounds. This style of interrogatory may remove an ambiguity, or at least isolate it. If an important ambiguity lingers after contention interrogatories have been answered, an opposing party can scarcely argue that his or her expert should be spared from supplemental discovery.

In summary, when an expert like Dr. DiGregorio articulates "some" grounds for an opinion, he forecloses a judicial inquiry respecting the "sufficiency" of those grounds, and invites a scientific inquiry respecting the validity of his opinion. Judges have neither the ken nor the right to conduct scientific inquiries. [16]

[15]** **[*230]** II

The more intriguing question is what "cause" needs to be "shown" to justify supplemental discovery from a party's designated expert. Dow makes the usual argument that "cause" is "shown" whenever there are "circular" or possibly "undisclosed" grounds for an expert's opinion. Dow may be right. But this style of argument only puts the question to be answered, and it implicates the same practical concerns that we previously addressed, *e.g.,* how can we tell a "circular" ground from a "square" one.

Unlike the other parts of Rule 4003.5, part (a)(2) plainly envisions that there may be *some* cases where we should authorize supplemental discovery from an expert witness.

Rule 4003.5(a)(2) does not describe those cases. [17] Instead, it establishes a "process" for parties who want supplemental discovery from their opponent's experts. This process implicates persuading a judge, and the rule explains that a judge may not grant this sort of request except "upon cause shown."

[16]** No one has ever articulated what "cause" needs to be "shown" to trigger the provisions of this rule. We are unable

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"inference").

[13] *See e.g.,* Clark v. Hoerner, 525 A.2d 377 at 382 (Pa.Super. 1987) (reversing a trial court ruling which allowed "surprise" expert testimony, and explaining that Rule 4003.5 is designed to avoid such mischief).

[14] *See e.g., Brittain v. Merrell Dow Pharmaceuticals, Inc.,* 36 Cumberland L.J. 497 (1986) (en banc) (explaining that litigating discovery motions is rarely a good way for lawyers or judges to best utilize their time). *Accord, Bruce v. Commonwealth,* 35 Ches. Co. Rep. 132 (1987).

[15] *See* Wilkerson v. Allied Van Lines, Inc., 521 A.2d 25 at 32 (Pa.Super. 1987) (using *dicta* to suggest that parties should use requests for admission to cure problems of this sort).

[16] Some judges, of course, have extensive training and experience in the sciences. Nevertheless, these judges are likely to encounter ethical difficulties if they inject themselves into a litigation by using their knowledge to formulate or to express a scientific opinion respecting the validity of another scientist's conclusions. *See e.g.,* ***Canon 3(c)(1)(a),*** *Code of Judicial Conduct* (ostensibly requiring a judge to disqualify himself in a proceeding where he has personal knowledge of relevant disputed facts).

[17] *See* ***HN2*** Pa. R.C.P. 4003.5(a)(2): "Upon cause shown, the court may order further discovery by other means, subject to such restrictions as to scope and such provisions concerning fees and expenses as the court may deem appropriate."

It may be useful to note that this rule does not use the expression "good cause." *Compare* Rule 4010 (relating to physical examinations of a party). *See also* Augustine, 481 A.2d at 325 [fleeting dictum using the expression "good cause" when referring to Rule 4003.5(a)(2)].

to find any Pennsylvania decisions which define or even apply the "cause shown" requirement of Rule 4003.5(a)(2). Neither can the parties, although each seems to think that we may find some guidance in *Augustine v. Delgado.* [18] We [*231] tried, but that decision implicates Rule 4003.5(c), and makes no attempt to define "cause shown." [19]

Without precedent, the only sensible course is to follow the "rules" and to look to them for guidance respecting the meaning of "cause shown." Rule 127 explains that the goal of interpreting any rule is to determine and carry out the intention of the Supreme Court. [20]

Determining the [**17] court's intention respecting Rule 4003.5(a)(2) is relatively easy. The Supreme Court made a part of its intention very plain more than two decades ago. In Nissley v. Pennsylvania R.R., 435 Pa. 503 (1969), the Court said:

We have moved away from what was described as "the sporting theory of justice" and have embraced a theory of wide-ranging and mutual discovery. "One advantage of discovery is the protection it gives the adversary against surprise evidence which can be proven false or which can be put in a truer and less damaging light if there is opportunity to investigate the matter and produce rebutting or qualifying facts."

Id. at 507.

It seems safe to assume that the Supreme Court expects that Rule 4003.5(a)(2) will be used to reduce the risk of trial by ambush. On the other hand, we should not ignore the plain fact that unless a party serves an opponent with the interrogatories authorized by Rule 4003.5, there will be *no* expert witness discovery, and trial by ambush is a distinct possibility. [21] To put this differently, Rule 4003.5 is *available* [*232] to parties who want to know what experts their [**18] opponents intend to call at trial, and what those experts are going to say. Whether parties use this rule is entirely up to them. [22]

Meanwhile, trial surprise was hardly the only concern that animated Rule 4003.5. If that were so, expert witnesses would be treated the same as any other witnesses. In brief, we would not have a convoluted rule like the one that was promulgated.

It seems clear that Rule 4003.5 represents a compromise between a *full* disclosure practice respecting expert witnesses and the *no* disclosure practice which existed when this rule was first announced. Before 1979, discovery from expert witnesses was virtually [**19] nonexistent. It was sometimes barred because it was annoying, oppressive, or embarrassing. [23] Moreover, courts often took the stance that an expert's opinion was protected under the "work product" doctrine. [24] Finally, no deponent could be obliged to give an opinion as an "expert" over his or her objection. [25]

Rule 4003.5 takes us a few steps [**20] beyond these concerns and explicitly authorizes *some* discovery from expert witnesses as a matter of right. [26] Nevertheless, the older [*233] concerns linger, and some are enshrined in different parts of Rule 4003.5. For example, there is a distinct aroma of "work product" emanating from 4003.5(a)(3) which bars *any* discovery from an expert who was consulted by a

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[18] 481 A.2d 319 (Pa. Super. 1984).

[19] *Compare* id. at 325 (*dicta*, suggesting that permission to depose a party's expert should not be "routinely granted").

[20] *See* Pa. R.C.P. 127 (explaining that the object of all interpretation and construction of rules is to ascertain the intention of the Supreme Court, and describing a style of analysis for achieving that goal).

[21] This risk is lessened in those Pennsylvania counties which use a local rule to mandate an exchange of what amounts to a pretrial memorandum. *See e.g.*, Allegheny County Local Rule 212.

[22] *Compare* Linker v. Churnetski Transp., Inc., 520 A.2d 502 at 505 (1987) (suggesting that parties that refrain from using discovery tools may forfeit the right to challenge "surprise" expert testimony at trial). *Accord*, Werner v. Dept. of Public Welfare, 530 A.2d 1004 (Pa. Commw. 1987).

[23] *See e.g.*, Feldman v. Seligman & Latz, Inc., 9 D & C 2d 394 (1957) (allowing discovery); Wright v. Philadelphia Transp. Co., 24 D & C 2d 334 (1961) (barring discovery by deposition)

[24] *See e.g., Zimmerman v. Kraftco Corp.*, 36 Leh. Co.L.J. 176 (1975).

[25] *See* Neal, 530 A.2d 103 at 107 n.2 (Pa. Super. 1987) (explaining the practice under a discovery rule that was repealed in 1979). *Compare*, Jistarri v. Nappi, 549 A.2d 210 at 219-21 (1988) (Judge WIEAND, concurring and dissenting. Although conceding that the prior practice allowed an expert to refuse to answer any opinion questions, Judge WIEAND raises the intriguing question whether there ever was a legal justification that could support that practice).

[26] A commonly asked question is how much discovery is authorized as a matter of right. For an answer, *see e.g., Benson v. Dorko*, 35 Cumberland L.J. 231 (1984) (en banc) (holding that "cross-examination" information respecting a party's expert is not discoverable).

party, but who is not expected to be called at trial. [27]

Moreover, there is an obvious concern respecting annoyance and oppression which is built into the multiple tier discovery scheme of *Rule 4003.5*. The only discovery that is allowed as a matter of right are interrogatories, and these are expressly limited to **[**21]** the discrete subjects described in *Rules 4003.5(a)(1)(a)* and *(b)*. [28] Supplemental discovery from an expert is only available by stipulation between the parties, or *after* a successful application to a judge who *first* must be satisfied that there is "cause shown." [29]

[22]** Annoyance and oppression are relative terms. They only have meaning when they are related to someone or something. The pre-rule decisions seem to associate annoyance **[*234]** and oppression with *money*. [30] These expressions were euphemisms for the simple truth that expert witnesses were expensive.

The Supreme Court likely perceived wholesale discovery from experts as *too expensive*. To put this differently, we doubt that *Rule 4003.5* was the product of any serious concern about "inconveniencing" designated experts. In the first place, this kind of expert was not segregated from other experts until *Rule 4003.5* was promulgated. Meanwhile, a designated expert is a curious jural person. These persons usually have no connection with a litigation unless or until they are consulted by a party that is seeking assistance with a litigation strategy. [31] Most designated experts earn a substantial part of their income from their litigation activities. They **[**23]** bill for practically every word they utter. They *rarely* object to being deposed so long as someone pays them for their time. They get paid when they are initially consulted, and they expect to get paid if they testify at trial. [32] Getting another check for a deposition would be an unexpected "bonus." [33]

All things considered, it seems fair to infer that the expense associated with wholesale discovery from designated **[*235]** experts played a large role in forging the compromise that is embodied in the scheme of *Rule 4003.5*. [34]

[24]** Hence, we arrive at the conclusion that the Supreme Court wants us to look at "cause shown" with twin lenses: From one we see that the court intended to authorize as much discovery as was necessary to prevent unfair surprise or ambush, and from the other we see that the court wanted this discovery accomplished in an inexpensive manner.

In brief, "cause shown" is a rubric for judicial discretion. The court seems to be telling us to use our discretion in a way that maintains a "balance" between trial surprise which is underserved and the cost of communicating with experts which is usually substantial.

Judicial discretion is one of our favorite intrigues, largely because it has displaced "rules" in almost every important

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[27] For an excellent discussion of the underlying justifications for this bar, *see Goldblum v. INA*, 127 Pitts.L.J.249 bar, *see Goldblum v. INA*, 127 Pitts.L.J.249 (1979)(Opinion by WETTICK, J.)

[28] *Compare Benson*, 35 Cumberland L.J. 231 (1984) (en banc) [striking interrogatories which went beyond the subjects identified in 4003.5(a)(1)(a) and (b)].

[29] *Compare* ***F.R.Civ. P. 26(b)(4)(A)(ii)*** : *"upon motion,* the court may order further discovery by other means, subject to such restrictions as to scope [and fees and expenses] as the court may deem appropriate." (Emphasis supplied.) Speaking broadly, the older federal decisions seemed to equate "upon motion" with "***cause*** shown" and required a "compelling need" or "exceptional circumstances" before authorizing the ***deposition*** of an ***expert*** witness over an objection. The recent decisions authorize ***expert depositions*** as a matter of course and do not bother to articulate a reason. The only condition usually imposed is that the party *requesting* the deposition must pay the expert whatever feesare required. *See e.g., American Steel Products Corp. v. Penn Central Corp., 110 F.R.D. 151 (S.D.N.Y. 1986). See also id. at 152 n.1* (collecting earlier decisions from Pennsylvania federal courts which declined to authorize wholesale discovery from an expert witness).

[30] *See e.g., Wright, 24 D & C 2d 334, 340-41 (1961).* ("The ultimate goal of the discovery process should be to expedite the just disposition of litigation and to minimize *the expense."*)

[31] *See supra* n.5 (describing the experts contemplated by *Rule 4003.5*).

[32] For an example of the sums to be earned by professional witnessing, *see Mohn v. Hahnemann Medical College, 515 A.2d 920 (Pa. Super. 1986)*. For a discussion, *see* Note, *Contingent Fees for Expert Witnesses in Civil Litigation*, 86 Yale L.J. 1680 (1977).

[33] It may also be a good warm-up or rehearsal for trial. For a brief discussion of the pros and cons respecting the wisdom of deposing an opponent's expert, *see* W. Schwarzer & L. Pasahow, *Civil Discovery* at 34-37 (1988).

[34] On the surface, the only "older" concern that was abolished by *Rule 4003.5* was the notion that an expert could simply refuse to answer any "opinion" questions. Even here, there are some doubts. *See e.g., Jistarri, 549 A.2d at 219-21*, discussed *supra* n.25. *See also Williams v. So. Hills Health System*, 130 P.L.J. 259 (1982) (barring opinion testimony from an expert who was unconnected with the litigation, but leaving open the possibility that there might be instances where the interests of justice would require a contrary conclusion).

area of the law. It may be jarring, but American jurisprudence is overdosed on judicial discretion. [35] Lawyers no [*236] longer can safely predict how judges will rule on important questions. [36] Frankly, it is a wonder that their clients even bother to listen to what they say. [37]

[**25] This development is beyond our control, although we do what we can to avoid the appearance of making *ad hoc* or capricious decisions. It is our habit to exercise judicial discretion only *once.* Afterwards, every litigant in the same circumstances has a *right* to the same ruling. From what we can gather, this conduct is *required* by an elementary principle of justice, namely, that parties in like circumstances should be treated in a like manner. [38]

Nevertheless, we are reluctant to volunteer a rule of decision that defines "cause shown" for all cases. As a practical matter, some "cause shown" motions do not implicate "circular" or possibly "undisclosed" grounds for an expert's opinion. For example, lawyers occasionally attempt to show cause in order to obtain cross-examination material respecting an opponent's expert. Cross-examination data is immunized from discovery as a matter of right, but [**26] there may be an appropriate case which warrants supplemental discovery of this sort.

Moreover, a rule of decision that is broad enough to encompass all "cause shown" motions is likely to have the practical effect of authorizing supplemental discovery almost [*237] as a matter of right. [39] The parties with the deepest pockets would get all the expert discovery they want. Those with little or no means will get what they can afford.

The Supreme Court scarcely needs us to achieve this kind of result. That could have been accomplished with a "rule" that authorized supplemental discovery from experts as a matter of right conditioned only upon the payment of all related expenses by the party seeking such discovery. The Supreme Court declined to promulgate such a rule, and we can hardly use judicial discretion to create a rule which the court rejected.

Exercising the power of decision styled judicial discretion obliges a court to act in a thoughtful and rational manner. In brief, we should consider all of the factors which may inform our decision.

An important factor to be considered is the financial [**27] inequality of parties. This is a nagging concern. For example, it is beginning to surface again in the federal decisions. Speaking broadly, federal judges have some new discovery rules which implicate "cost-shifting" devices. [40] These devices may help to spare impecunious litigants from the expense of unnecessary discovery, but no one seriously contends that "cost-shifting" will ever succeed in putting parties on the *same* financial footing. Frankly, the cost-shifting devices may be more trouble than they are worth. It looks to us like federal judges may wind up conducting too many evidentiary hearings on collateral matters like determining whether a party has or has not violated the certification requirement of F.R.Civ. P. 26(g). [41]

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[35] For a recent discussion which both recognizes and defends American dependence upon judicial discretion, *see generally* Bogdan, *Conflict of Laws in Air Crash Cases: Remarks from a European's Perspective,* 54 J.Air.L. & Com. 303 (1988). Bogdan is a Swedish law professor and he offers the observation that the "non-rule" approach in the United States may be justified because American judges are recruited from the ranks of practicing attorneys with substantial experience. As such, they are likely to have "judicial intuition" that will lead them to reasonable conclusions even when the rule in a particular case is that there is not and should not be any fixed rule. *Id.* at 340. Continental countries select trial court judges right out of law school, and there may be a greater need to supply these younger judges with the guidance (and security) that "rules" supply. *Id.*

Professor Bogdan is practically alone in his attempt to justify the "non-rule" approach in the United States. For a devastating foreign criticism of our excessive reliance upon judicial discretion as a panacea for all that ails American jurisprudence, *see generally* Robertson, *Forum Non Conveniens in America and England: "A Rather Fantastic Fiction,"* 103 Law.Q.Rev. 398 (1987). Professor Robertson is an English law professor who has litigated cases in United States Courts. His criticism is harsh and he comes within an eyelash of recommending the indictment of American jurists for using judicial discretion to hide usurping powers they do not rightfully possess, playing politics and so on. *Id.* at 424.

[36] *See e.g.,* Robertson, *supra* n.35 at 424.

[37] *Id.*

[38] *See e.g.,* Friendly, *Indiscretion About Discretion,* 31 Emory L.J. 747 at 758 (1982) (citing authorities and describing the demand that judges act alike in all cases of a like nature as "the most basic principle of jurisprudence").

[39] This seems to be the approach of many federal courts. *See supra* n.29.

[40] For an excellent discussion, *see* W. Schwarzer & L. Pasahow, *supra* n.33 at 14-18.

[41] Then again federal judges may have the time to spare for these hearings since Congress seems intent on eventually abolishing diversity jurisdiction and curtailing federal question jurisdiction. For Congress' latest endeavor, *see* The Judicial Improvements and Access to Justice Act, Pub. L. No. 100-702, Sec. 201, 102 Stat. 4642,

[**28] [*238] Meanwhile, we may, and probably should take judicial notice that much of the litigation that implicates designated experts also involves contingency fees and well-heeled law firms on the side of an injured plaintiff, and insurance companies on the side of some hospital or manufacturer. In brief, most of the "cause shown" motions we see arise in cases that come under the heading of product liability or medical malpractice.

Nevertheless, dollars still count no matter which side spends them. Litigation is a costly proposition for all parties, and modern litigants can ill afford the additional expense of making a lot of experts happy with yet another paycheck. Expert witness fees are second only to counsel fees as a litigation expense for a party. [42] Indeed, the expense associated with expert witnesses has become so great that many think we should authorize *contingency* fees for experts. Otherwise, we risk denying justice to many parties who simply cannot afford their charges. [43]

[**29] At the same time, it is hard to ignore some simple truths about modern litigation. First, like it or not, major civil litigation has evolved into a battle "between experts" in which the parties are often the least important witnesses on the issues of liability or damages. [44] Lawyers know as much, and in substantial cases, they frequently agree to depose each other's ***experts***. Hence, "***cause*** shown" motions are usually presented when one side refuses to agree to exchange ***expert depositions***.

[*239] The lawyers who present "***cause*** shown" motions are almost always animated by terror: They are usually worried stiff that an opponent's ***expert*** may offer additional or "undisclosed" grounds for an opinion at the time of trial. [45]

[**30] This is a legitimate concern, in part, because these lawyers are unable to *predict* how a trial judge will rule when they object that an expert is testifying beyond the "four corners" of his or her report. [46] Trial judges have considerable discretion in such matters, and forecasting their decisions is as risky as "trying to tattoo soap bubbles." [47]

On the other [**31] hand, it is easy to defend our trial judges: It is nearly impossible to hold any expert to the "four corners" of a circular report. [48]

Although we decline to volunteer a definition of $ cause shown "for all cases, most of the cases that we see are like the one *sub judice,* and implicate "circular" or possibly "undisclosed" grounds for an expert's opinion. In this style of dispute, we usually deny "cause shown" motions *unless* a moving party first offers an opposing party an opportunity to [*240] "cure" any deficiencies in his or her expert's report. [49] In brief, we almost always require moving parties to ask opposing parties "a few more questions" *before* coming to court. [50]

4646 (1988) (increasing the amount in controversy in diversity cases to $50,000). *See also* H.R.Rep. No. 889, 100th Cong., 2d Sess. at 37-39, *reprinted in* 1988 U.S. Code Cong. & Admin. News 5997-6000 (explaining the purposes behind amending the diversity requirements). Meanwhile, guess which courts get to hear the cases federal courts are increasingly able to avoid.

[42] *See* Note, *supra* n.32 at 1680-81 (also collecting cases which graphically describe fees charged by experts).

[43] *See e.g.,* Note, *supra* n.32; *Accord,* Note, *The Contingent Compensation of the Expert Witness in Civil Litigation,* 52 Ind.L.J. 671 (1977).

[44] *See e.g., Mohn, 515 A.2d 920 (Pa.Super. 1986).*

[45] *See e.g., Mecca, 530 A.2d 1334 at 1341 (Pa.Super. 1987)* (mentioning this problem, and suggesting that if a party fails to cure an ambiguity before trial that party probably deserves the expert testimony that is presented at trial); *Accord, Painter v. Pennsylvania Elec. Co., 534 A.2d 110 (Pa.Super. 1987).*

[46] *Id.* Speeking broadly, trial judges have an understandable tendency to let as much evidence in as they can because it increases the likelihood that a jury will come to a just result. However, sometimes a trial judge changes his or her mind afterwards. For a rare example of mind changing in a "four corners" context, *see Wilkes-Barre Iron & Wire Works, Inc. v. Pargas of Wilkes-Barre, Inc., 502 A.2d 210 (Pa.Super. 1985).*

[47] It's hard to resist a metaphor this compelling even though we borrowed it out of context. It frequently appears in commentary respecting the law of personal jurisdiction, and has its roots in Kennelly, *Litigation of Foreign Aircraft Accidents: Advantages (Pro and Con) From Suits in Foreign Countries,* 16 Forum 488, 492 (1981)

[48] *See e.g., Augustine, 481 A.2d 319 (Pa Super. 1984)* (devoting almost an entire opinion to a review of a trial judge's decision that an expert did not stray too far from his discovery responses).

[49] There may be no difference between this "procedure" and a "rule" that defines "cause shown." All "rules" begin with a procedure. For the classic discussion of this notion, *see generally,* Bowers, *The Judicial Discretion of Trial Courts,* Secs. 1-9 (1931). *See also id.* at Secs. 3-4 (explaining that procedural law came long before substantive law, and quoting Justice Holmes as saying, "When we trace a leading doctrine of substantive law back far enough, we are likely to find some forgotten circumstance of procedure at its source.").

[50] *See supra* text following n.14 (explaining how requests for admissions and contention interrogatories may be useful in this respect).

[32]** For example, if a responding party answers requests for admissions in a way that suggests that there may be "undisclosed" grounds for an expert's opinion, "cause" for supplemental discovery is *easily* "shown." The same may be said whenever contention interrogatories are answered in a way that leaves an ambiguity about an issue that may be important to the litigation.

Whenever "cause" is "shown," we usually assess *responding* parties with whatever "reasonable" expenses may be associated with supplemental discovery from their expert witnesses. This seems fair since, in hindsight, they made a misleading answer to their opponent's expert witness interrogatories at the outset, and they stubbornly declined an opportunity to file a supplemental answer despite being prodded in that direction by an opposing party.

This procedure seems like the *least expensive* way to solve many of the ambiguities perceived by moving parties. Equally important, it spares us from having to play engineer, doctor, chemist, and so on. This is how we exercise our judicial discretion. [51]

[33]** **[*241]** This approach is consistent with the intent of the Supreme Court, largely because it maintains a balance between disclosure, which is necessary, and expenses, which are not. Meanwhile, it happens to resemble a "procedure" which the Superior Court recently approved when we faced similar problems with petitions under the Motor Vehicle Financial Responsibility Act. [52]

There is nothing new or surprising in this opinion for those lawyers who regularly appear in Discovery Court. Frankly, this opinion is not for them, but rather for the majority of lawyers who are seldom involved in sophisticated disputes respecting expert witnesses. Hopefully, the instruction we supply will allow these lawyers to avoid unnecessary discovery scrimmages.

For these reasons, then, Dow's motion for leave to depose Dr. DiGregorio is DENIED without prejudice. It may be presented again, if necessary, **[**34]** in accordance with the instructions in this opinion.

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[51] Compare the federal practice described *supra* n.29. *See also* W. Schwarzer and L. Pasahow *supra* n.33 at 34-38. Judge Schwarzer explains that in federal cases in which experts will play an important role, counsel routinely stipulate to depositions. In the absence of a stipulation, federal courts "usually" order expert depositions. *Id. at 36*.

Judging from our experience, we doubt that counsel would be so willing to stipulate if federal courts were not so quick to grant motions to depose counsel's experts. Meanwhile, wholesale discovery from experts is just as expensive in federal courts as it is in state courts. The federal practice respecting expert discovery seems to be at odds with "cost shifting" and any professed concern for the escalating expense of modern litigation.

[52] *See e.g., State Farm Mutual Automobile Ins. Co. v. Zachary, 536 A.2d 800 (Pa.Super. 1987)* (requiring an insurance company to give an insured a chance to cure any deficiencies in his or her proof of claim before asking the court to order a physical examination).

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Exhibit 2

Expert Report of Andrew A Marino

August 8, 2016

This report was prepared by Andrew A. Marino at the request of Stephen G. Harvey, counsel for Maria Povacz, Laura Sunstein Murphy, Diane and Stephen Van Schoyck, Cynthia Randall, and Paul Albrecht as Complainants in litigation before the Pennsylvania Utility Commission with PECO as the Respondent. For convenience of presentation on complex subject matter, the report is presented in question and answer format**.**

Purpose

Q. What is the purpose of your report?

A. My first purpose is to express my professional opinion that there is a basis in established science for Complainants' concern regarding risks to human health caused by man-made electromagnetic energy in the environment, including the type of electromagnetic energy emitted by smart meters, and to describe the scientific basis of my opinion with particularly.

My second purpose is to express and explain my professional opinion that it would be unreasonable to involuntarily and chronically expose the Complainants to the electromagnetic energy emitted by smart meters. Scientific evidence indicates that the neurological syndrome of electromagnetic hypersensitivity exists. There is a reasonable basis to believe that the symptomatology of the Complainants and its relation to smart-meter electromagnetic energy is factual. There is a basis in established science to

support the Complainants' concerns that future exposure to smart-meter energy will worsen their already precarious medical conditions. Ample scientific evidence indicates that the aforementioned exposure would be a risk to the health of the Complainants.

Qualifications

Q. What are your qualifications to express these opinions.

A. I earned a PhD in biophysics in 1968 and a JD in 1974. My curriculum vitae is attached as Exhibit 1. Briefly, from 1964 to 2014, I worked full-time teaching and performing research in the area of experimental biology that deals with the role of natural electromagnetic energy in animals and human beings, and with the effects of man-made electromagnetic energy on animals and human beings. I retired from those duties in 2014 and began working on developing commercial technology capable of obtaining clinical diagnostic information from measurements of the electroencephalogram, which is the natural electromagnetic energy emitted by the brain.

Q. Where did you conduct your research on electromagnetic energy?

A. For the first sixteen years of my career, at the Veterans Administration hospital in Syracuse, New York. For the next thirty-three years, my research laboratory was in the LSU medical school in Shreveport Louisiana, where I served full-time as a professor in the departments of orthopedic surgery, neurology, and cellular biology and anatomy.

Q. Regarding your teaching responsibilities, what did you teach, and to whom?

A. To medical students, I taught musculoskeletal medicine, the scientific basis of medicine, experimental biology, human research methods, and the legal-ethical responsibilities of physicians. To graduate students I taught the cognitive structure of science, which is the framework within which researchers make valid observations and attach meaning to them, and I taught particular techniques of experimental biology. To medical residents and medical fellows I taught specialized subjects, for example, methods of analysis of the electrical activity of the brain, and general subjects, for example how to formulate a clinically relevant hypothesis and then answer it by means of an animal or human experiment.

Q. What area of science is relevant to the issue of health risks posed by smart meters?

A. The general area is experimental biology, by which I mean the scientific method for finding reliable knowledge about living systems.

Q. Did you author peer-reviewed scientific publications in your area of expertise?

A. I wrote many peer-reviewed publications dealing with all aspects of electromagnetic energy, including its biological effects on humans, animals, cells, its biophysical effects on biological molecules, and its engineering

characteristics. These publications are listed in my curriculum vitae which is attached as Exhibit 1.

Q. What is electromagnetic energy?

A. It is one of the four basic forces in the universe. Electromagnetic energy is present within all living things; it regulates the function of every cell in the body and serves as one of the two basic languages of the brain, the heart, the nervous system, and the musculoskeletal system. Electromagnetic energy occurs naturally in the environment, for example, the earth's magnetic field, and has a profound influence on all basic biological phenomena including growth regulation and control, circadian rhythms, and spatial orientation. Since the beginning of the twentieth century, and particularly after the end of World War II, the levels of man-made electromagnetic energy occurring in the general and work-place environments have risen dramatically as a result of man's economic and social activities.

Q. What activities?

A. The things that characterize and define modernity: the telegraph, radio, television, radar, powerlines, cell phones, wireless networks, smart meters, and innumerable other similar examples.

Q. What kind of human experiments did you do, and why?

A. In clinical research involving patients suffering from orthopedic diseases, mu colleagues and I applied simulated natural electromagnetic energy for the purpose of bringing about cures. In laboratory research, we exposed clinically normal volunteers to simulated man-made electromagnetic energy of the type and at the levels that are pervasively present in the environment. Our goal was to obtain fundamental knowledge about how the human body detected the presence of man-made electromagnetic energy.

Q. What was the objective of the laboratory research that involved the normal volunteers?

A. There are three basic kinds of theories regarding how man-made electromagnetic energy can affect the human beings and animals. Each theory hypothesizes a different process regarding how the energy interacts with the living system. My objective was to test the theory that the process is *sensory transduction,* which is how the body detects all other signals including light, sound, heat, pressure, and pain. Previous research by my colleagues and I had indicated that transduction was a likely process by which the body detected electromagnetic energy, See *Electromagnetism and Life* (Exhibit 1) and Exhibit 2 at No. 75, 90, 94, and 98.

Q. Were the experiments completely safe for the volunteers?

A. The present scientific evidence regarding the health risks due to man-made electromagnetic energy link *chronic exposure* to disease. By that term I mean exposure that is continuous and/or continual. The volunteers were exposed to the energy for only about ten minutes. That information was presented to them in a written informed-consent document whose content was approved by an impartial committee, as required by federal law. They were told that there were no known risks because exposure would last for only a few minutes, but the volunteers were not told that the experiment was completely safe. Such statements cannot be proven and are therefore not permitted in consent forms for human studies.

Q. What were the results of the experiments?

A. Briefly, that human beings have the sensory capability to detect man-made electromagnetic energy of the type present in the general environment, including the type produced by smart meters. Information concerning the presence of the energy in the subject's environment is transmitted to the brain, where it is processed. These publications are listed in Exhibit 2 at No. 60, 61, 64,68, 69, 70, 74, 75, 83, 84, 94, 96, 97, 100, and 102.

Q. What were the consequences in the volunteers after they detect the electromagnetic energy?

A. Systems in the body discarded the information because it served no useful purpose for the body, by which I mean an evolutionarily conditioned purpose. Information contained in light or sound, as examples, is key to the survival of animals and humans. In contrast, man-made electromagnetic energy in the environment has no biological benefit. From a physiological perspective purpose the energy is a kind of pollution because it was not put in place with the intention of affecting the human body. The key point of the experiments was to prove that the information entered the body, which is an absolutely necessary step for any adverse changes to eventually develop.

Q. If the information is discarded, how can adverse effects subsequently develop?

A. One possibility is that process of discarding information has a physiological cost. Discarding information is an adaptive process, but the ability of the body to adapt is finite. If that ability is exceeded the result can be clinically recognizable stress and/or stress-related disorders. Such conditions, in turn, promote the development of disease.

Q. How many times does the adaptive process need to occur before adverse effects occur?

A. We did not address that question in our experiments. Within the framework of these experiments I can say only that the information activates various cells in the brain, but not the cells that produce consciousness. We know

that was the case because the volunteers were always unaware of the presence of the energy to which they were exposed, even though it changed the electrical activity of their brains.

Q. Would you briefly describe how you did these experiments and what you measured?

A. I designed and built an apparatus that permitted me to expose the volunteers to man-made electromagnetic energy. During the experiment I continuously recorded the electroencephalogram from six locations on the scalp. The energy was turned on and off according to a timing pattern that was unknown to the volunteer. Using technical methods of data analysis that I developed with colleagues, we compared the electrical activity in the brain that occurred in the presence and absence of the energy. In essentially every volunteer, we found to a statistical certainty that the brain activity differed between the two conditions, meaning that each volunteer had detected the energy, which is a condition precedent to all biological effects caused by man-made electromagnetic energy.

Q. What kind of animal experiments did you do, and why?

A. I did experiments on rats, mice, rabbits, and fish. Different experiments were done for different purposes.

One purpose was to test my hypothesis regarding the physiological process by which chronic exposure to man-made electromagnetic energy can

ultimately lead to human disease and disorders. There are several basic kinds of theories. Our theory was that exposure was a stress on the body, and that if the stress continued too long the body's inherent protective and adaptive mechanisms would ultimately break down, resulting in clinical disease. We tested our theory by measuring endpoints in rats and mice that would be expected to be altered if the electromagnetic energy were a stressor, and we were successful.

Another purpose was to determine the anatomical location of the cells in the body that actually detected the man-made electromagnetic energy. There are two basic kinds of theories regarding this issue, one holding that *all* cells can detect the energy, the other that only specialized cells can detect the energy, similar to specialization that accounts for the detection of light, sound, taste, pressure, and pain. We favored the latter theory and tested it using rabbits, which are sufficiently large that the energy can be reasonably localized, permitting assessment of whether the rabbits' brain electrical activity is altered when the energy was present. These studies were successful.

A third purpose was to test my hypothesis regarding the biophysical process responsible for detection of environmental-level man-made electromagnetic energy. There are three major types of theories in this area. One theory holds that none exists. This theory originated in Germany during World War II, and is outmoded even though it remains as the basis of the present FCC rules regarding safety of cellphones and smart meters. A second theory envisions direct effects of the energy on the DNA of the subject. A third theory is based on the process of sensory transduction, which I described hereinabove.

My colleagues and I conducted experiments with fish to test whether a particular biophysical process could account for the sensory-transduction of low-frequency electromagnetic energy, and we were successful.

The results of the experiments I described can be found in Exhibit 2 at No. 1, 54, 66, 76, 85, 86, 88, 89, 92, 92, 99, 102, 104, 110, 111, 112, 118, 119, and 120.

Q. Why did you use fish?

A. Because the methodology we used, one of the most advance techniques presently used in experimental biology, would have been impossible in any other animal species.

Q. Is the biophysical process you described the same one that accounts for how the electromagnetic energy from smart meters is detected?

A. No. It cannot serve as a biophysical explanation for detecting smart-meter energy. But in a recent human experimental study I presented evidence for a different biophysical process that can provide such an explanation (Exhibit 2 at No. 1).

Electromagnetic Energy

Q. Are there different types of electromagnetic energy?

A. At an engineering level there is an infinity of technically different types of electromagnetic energy. Essentially, at an engineering level, every kind of

energy-emitting device emits a different type of energy, as does every brand of each such device. But with respect to the issue of health risks posed by exposure to man-made electromagnetic energy, including that emitted by smart meters, there is no material difference among the infinity of technically different types because there is no empirical evidence that they produce different kinds of biological effects. Consequently the technical differences are irrelevant, at least for the purposes of assessing human health risks.

Q. What is the basis of you opinion that they are irrelevant?

A. There is a large scientific literature regarding the effects on human beings and animals caused by man-made environmental electromagnetic energy, but the literature contains no credible indication that the effects are related to differences in the technical type of the electromagnetic energy. Actually the opposite is true, as I first pointed out in 1982, in *Electromagnetism & Life* (see Exhibit 1).

Q. What do you mean when you say that the opposite is true?

A. In my book I presented clear evidence that the same biological effect could be produced by technically different types of man-made electromagnetic energy. Since the book was published there have been many confirmations of my original conclusion. From animal studies we can now see that essentially any biological system in the body can be altered by environmental-strength levels of

any technical type of electromagnetic energy. See Exhibit 2 at No. 7, 16, 18, 19, 23, 29, 35, 48, 51, 67, 72, 82, 87, 88, 89, 91,92, 93,122, 128 and 140.

Q. You said there were no technically different types of electromagnetic energy as regards evaluating health risks of man-made electromagnetic energy. Are there general types of electromagnetic energy?

A. Yes. I think it is useful to divide man-made electromagnetic energy into two classes, based on the biophysics of the process by which the human body detects them (see Exhibit 2 at No 1 and 76). Almost all commercial sources of electromagnetic energy fall into one or both classes, which I will call *low frequency* and *high frequency*. Examples of sources in the low-frequency class include low-voltage and high-voltage powerlines, household wiring, electric blankets, electric lights, computers, battery chargers, arc welders, and electric cars. Examples of sources in the high-frequency class include radio and television signals, radar, microwave ovens, wireless networks, computers, cellphones, and smart meters. Both classes of electromagnetic energy can cause the same biological effects in animals and human beings, meaning that the risks suggested by the observed effects are more or less the same for the two classes

Health Risks Due to Man-made Environmental Electromagnetic Energy

Q. When you said that there is a basis in established science for serious concern regarding risks to human health caused by man-made electromagnetic energy in the environment, what did you mean by “established science.”

A. I meant the two types of peer-reviewed publications that are the primary repository of our scientific knowledge about living systems including, of course, knowledge about the effects of electromagnetic energy on living things. The two types are *experimental studies* and *epidemiological studies*.

Q. What are experimental studies?

A. Experimental studies are well-established formal procedures for generating knowledge about nature. Generally, they involve the randomization of subjects to groups that are or are not exposed to the factor of interest, electromagnetic energy for example, measurement of a chosen biological parameter, statistical comparison of the measurements between the two groups, and a conclusion regarding whether or not the energy caused a change in the parameter measured. Such studies produce the most reliable type of scientific knowledge because they can rationalize the existence of cause-and-effect-relationships. As with all scientific studies, experimental studies have fundamental limitations.

Q. What are epidemiological studies?

A. They are non-experimental studies in which pre-existing information such as health data collected by government agencies is analyzed to assess whether a particular disease or disorder is statistically associated with a factor of interest, smoking for example. Such studies produce the most relevant type of scientific knowledge regarding health risks of electromagnetic energy because their

conclusions apply directly to human beings. Nevertheless their probative value is far more limited compared with experimental studies. This limitation arises directly from the logical structure of epidemiological studies.

Q. What do you mean?

A. Epidemiological studies are inherently incapable of evidencing a cause/effect relationship. The strongest kind of a conceptual link epidemiological studies can yield is that of an *association*. Associations sometimes foreshadow causal connections, sometimes not, and the investigator never knows which conclusion is correct

Q. What do you mean by “heath risk” and how is its existence determined scientifically?

A. By that term I mean a factor or condition that is reasonably suspected of contributing to the development of human disease or disorder.

There are two scientific methods for producing evidence that a specific factor or condition is a health risk. The traditional method for evaluating novel factors or conditions is to expose animals to the factor or condition and observe what happens. This method is commonly used to evaluate the safety of herbicides, pesticides, and cosmetics, food additives, and the safety of drugs.

Epidemiological studies constitute the second scientific method. They come into play when the factor or condition is not novel, but rather is generally present in the human environment. If the factor or condition is a risk factor, then a

natural experiment will have actually been performed, and evidence of possible adverse associations should be discoverable by studying sick people and assessing whether they had more of the factor or condition than did people who didn't get sick.

Public concern about a factor or condition is sometimes triggered by an epidemiological study that seems to suggest that the factor or condition is associated with the occurrence of a human disease or disorder. Typically the concern is amplified because there is no experimental evidence from animal studies showing safety.

Q. Is this what happened to the manufacturers of smart meters?

A. Yes. Many independent investigators throughout the world did epidemiological studies of the possible health risks of man-made electromagnetic energy from various sources, and these investigators reported that the energy was associated with a wide range of human diseases and disorders. See Exhibit 2 at No. 2, 15, 20, 21, 22, 25, 31, 32, 33, 38, 40, 41, 42, 44, 46, 47, 49, 62, 63, 71, 73, 79, 81. 82, 87, 95, 113, 121, 129, 130, and 133.

Q. Is the list exhaustive?

A. No.

Q. Why do you conclude that there is a basis in established science for serious concern regarding risks to human health caused by man-made

electromagnetic energy in the environment, including the type of electromagnetic energy emitted by smart meters?

A. Because both methods in experimental biology for assessing whether a factor or condition is a possible health risk, namely experimental studies and epidemiological studies, individually and together, indicate that man-made environmental electromagnetic energy is a health risk. Numerous peer-reviewed scientific studies in experimental biology involving the effects of man-made electromagnetic energy, including the type produced by smart meters, have shown that such energy causes a wide range of biological effects on the endocrinological, immunological, cardiovascular, hematological and neural systems of the body, and on growth and healing. The results of these studies are the best evidence obtainable by means of the scientific method regarding the possible existence of health risks to humans. Consequently these studies directly support the conclusion that exposure to man-made electromagnetic energy is a health risk to humans. In addition, many independent epidemiological studies indicate that man-made environmental electromagnetic energy is associated with a broad range of human diseases and disorders, especially cancer. It is difficult for me to imagine what further evidence would be needed to establish that there is a basis in established science for serious concern regarding risks to human health caused by man-made electromagnetic energy in the environment, including the type of electromagnetic energy emitted by smart meters.

Electromagnetic Hypersensitivity

Q. What is electromagnetic hypersensitivity?

A. It is a physiological condition in which the affected person experiences musculoskeletal, immunological, and/or neurological symptoms that flare or intensify upon exposure to man-made electromagnetic energy in the environment.

Q. Can you be more specific regarding what the symptoms are?

A. There are many reports in the literature in which investigators have listed or classified the symptoms. See Exhibit 2 at No. 2, 4, 5, 6, 8, 9, 10, 11, 12, 13, 24, 26, 30, 31, 32, 33, 34, 36, 38, 39, 40, 41, 45, 52, 55, 57, 63, 65, 77, 123, 124, 125. 126, 127, 134, 135, 136, 137, 138, 139. Essentially, the list consists of all the undesirable somatic reactions that human beings can experience. The complaint that people who suffer from electromagnetic hypersensitivity have in common is that they feel discomforted and/or unwell. They exhibit a general syndrome of just being sick, as opposed to exhibiting symptoms that are pathognomonic for a particular disease.

Q. Are you saying that man-made electromagnetic energy causes the symptoms?

A. Yes, in the but-for sense of causality.

Q. What do you mean by the but-for sense?

A. This is an important point. The available scientific and clinical evidence shows that man-made electromagnetic energy can trigger a symptomatic response in some human beings. Most studies indicate 5-10% of the general population self-report as suffering from electromagnetic hypersensitivity. See Exhibit 2 at No. 141, 142, 143, and 144. The energy isn't a complete causal explanation for the syndrome in the sense that gravity explains why objects fall. In a particular sufferer the energy causes the symptoms in the sense that the symptoms would not exist at that time but for the presence of the energy. Because human beings are all different, the precise level of the energy that can trigger a response, the precise set of symptoms, and their requisite level and duration of exposure differ profoundly among suffers. Presently the precise reasons why some humans report symptoms from man-made electromagnetic energy and others do not, why the symptoms vary from person to person, and how the symptoms depend on the levels and duration of exposure are all unknown. But these unresolved issues do not undermine the scientific conclusion that man-made electromagnetic energy causes the reported symptoms in some human beings.

Q. Including energy from smart meters?

A. Yes. That's the most reasonable inference I can make from the available evidence. There is no empirical evidence whatsoever to suggest that smart meters are somehow different from other sources of electromagnetic energy in

some meaningful way that would eliminate concern about health risks or about triggering hypersensitivity reactions.

Q. Have the possible health risks of smart meters with respect to hypersensitivity been studied in experiments?

A There are no published experimental studies, either by independently-funded investigators or by the industry.

Q. Is electromagnetic hypersensitivity like an allergic reaction?

A. Yes, in the sense that symptoms can flare or intensify when the person suffering from the disorder is exposed to levels of electromagnetic energy that normally don't trigger a symptomatic response in most people. But the condition is probably mediated by an aberration in the body's overall electrical regulatory system, not by an aberration in the body's biochemical-based regulatory systems, such as those that produce type-1 and type-4 allergic reactions.

Q. Is electromagnetic hypersensitivity a new condition that has just begun to appear recently?

A. During the last 35 years I met many people with self-diagnosed electromagnetic hypersensitivity. Public concern about it increased greatly during that period, especially after the increase in man-made energy in the environment that occurred following development of cellphones and wireless networks. Electromagnetic hypersensitivity can now be recognized as a part of

the larger problem regarding the public-health risks of man-made environmental electromagnetic energy.

Q. In what way is it a part of a larger problem?

A. Historically cancer was the focus of the risks due to electromagnetic energy, particularly cancer of the blood from low-frequency energy such as that from powerlines, and brain cancer from high frequency energy such as that from cellphones. Less attention was given to electromagnetic hypersensitivity. There was common notion that the sufferer could fix the problem by simply avoiding exposure to the device that emitted the energy. We can now see that is not always easy to do, as this case shows. Also the rules for diagnosing electromagnetic hypersensitivity have not been finalized in the sense of specific guidelines for use by primary-care physicians.

Q. Have you conducted human studies on electromagnetic hypersensitivity?

A. My colleagues and I conducted a controlled study in which we demonstrated to a statistical certainty that electromagnetic hypersensitivity was a real neurological syndrome, and the results were published See Exhibit 2 at No. 56.

Q. Would you briefly describe the study?

A. The subject was a young female physician with multiple neurologic and somatic symptoms including headaches, hearing and visual disturbances,

subjective sleep disturbances and non-restorative sleep, and musculoskeletal complaints, all of which she reported could be precipitated by exposure to environmental electromagnetic energy and abated by moving away from the energy source. Among the triggering devices she identified were cell phones, computers, powerlines, and various common electrical devices.

During extensive pre-study interviews she credibly explained the reasons for her belief that energy from common environmental sources could provoke symptoms. Her ability to do so was an important consideration in our decision to commit resources to the study, because, in my experience, those who suffer from electromagnetic hypersensitivity are usually not suitable volunteers for a scientific study of the syndrome

After she agreed to medical tests that were appropriate for evaluating her medical condition, she underwent a physical exam, a comprehensive neurologic exam, a clinical electroencephalogram, non-contrast magnetic resonance imaging of the brain, an overnight sleep study with video and expanded EEG montage, a standard laboratory evaluation of serum electrolytes and blood chemistry, liver function tests, and serum fasting cortisol determination. In the judgments of her attending physicians, none of her signs and symptoms supported a diagnosis in terms of any generally recognized specific medical disorder.

When my colleagues and I exposed her to electromagnetic energy in a scientific study under properly controlled conditions, she developed temporal pain, headache, muscle twitching, and skipped heartbeats. All these symptoms

occurred within 100 seconds after initiation of exposure to the energy. The causal link between the electromagnetic energy and the symptoms was proved to greater than a 95% certainty.

Q. How was it possible to be so certain that the subject actually suffered from electromagnetic hypersensitivity?

A. Because the determination was not a subjective clinical diagnosis but rather was based on the use of an objective scientific method, with appropriate use of statistical analysis.

Q. Would you describe how you were able to make that determination?

A. The subject sat in chair in a dark quiet room. The source of the electromagnetic energy was near her head, but she never knew whether or not the source was emitting energy at any particular time. A large number of separate trials were conducted to assess whether she exhibited <u>any</u> symptomatic response to the energy.

Q. What do you mean by a trial?

A. A trial consisted of a 100-second interval during which pulsed electromagnetic energy was or was not applied; the actual condition was chosen by the experimenter but was not known by the subject. When the interval began she had no symptoms. After it ended I interviewed her and asked whether she experienced any symptoms. If yes, I asked her to describe the symptoms, and to

characterize them as *mild* or *moderate.* Then I waited until she told me that the symptoms had abated. When they did we began a new trial. If no symptoms were reported we began the next trial immediately.

Q. What was the reason for doing many trials?"

A. From a scientific perspective it was necessary to compare the subjects self-reported symptoms between times when the energy was present or absent. That is the only possible way to show a causal link.

Q. Did the subject know when the energy was present?"

A. No. She wasn't told, she couldn't perceive it like a sound or a touch, and the experimental equipment was hidden from her view so that she had no cue when the energy was present.

Q. What was the basic result of the study?

A. Her symptoms sometimes began almost immediately after exposure to the energy began, and sometimes after the energy had been present for a few seconds. She reported moderate symptoms in 100% of the trials where the energy was present. She never reported a false result, by which I mean a claim that she had moderate symptoms following an interval where I did not apply the energy, which is called a sham trial.

Q. So the corresponding result for the sham trial was 0%?

A. Correct.

Q. You said that you didn't tell the subject when the electromagnetic energy was being applied. Is it nevertheless possible that she could have perceived it, like a light beam or a touch?

A. Based on our present knowledge, man-made environmental-strength electromagnetic energy is not consciously detected by human beings. We therefore expected that the subject would not be conscious of the presence of the electromagnetic energy that we applied. We conducted a separate study of that question and proved that she was not conscious of the presence of the energy, as expected. That was an important observation because, taken together with the observation showing 100% occurrence of moderate symptoms, the overall results provided our first insight into how the brain of persons suffering from electromagnetic hypersensitivity processes information.

Q. What is this first insight?

A. We showed that the subject was not aware of the energy but that it nevertheless triggered various somatic symptoms. The symptoms must therefore have been generated and controlled by information-processing in her brain that occurred below the level of the cerebral cortex, which is where consciousness is created. Then, as a result of information-processing in lower brain regions, the brain initiated electromagnetic and hormonal signals that initiated responses by

various organs in the body. This is the fundamental way the brain responds when it receives any sensory information, in the presence or absence of awareness, including but not limited to the presence of man-made electromagnetic energy. A prototypical response of the body to the presence of man-made electromagnetic energy is the triggering in the body of a condition known as stress. In most persons, the effect of the stress is not recognized clinically until after the person develops a clinically recognized disease. In hypersensitive persons, in contrast, the initial reactive process in the brain are overactive, and go beyond the initiation of stress, thereby immediately trigger somatic symptoms.

Q. Did you make any other observations that in your opinion are relevant to his case?

A. Yes. Based on our previous studies regarding how human beings and animals detect man-made electromagnetic energy, we expected that pulsed energy would be more effective than non-pulsed energy in producing symptomatic responses, and that was what we observed and reported in the provocation study. Smart meters emit pulsed energy.

Q. What overall conclusion do you draw from this study?

A. That, to a scientific certainty, the neurological syndrome known as electromagnetic hypersensitivity actually exists, as we showed using the scientific and diagnostic procedures I just described.

Q. Couldn't the same tests be done to determine whether the Complainants in this case actually suffer from electromagnetic hypersensitivity?

A. I estimate that the total cost of our study was between $500,000 and $1,000,000. But not only would the cost of performing the study routinely be prohibitive, it would be quite unnecessary.

Q. Why do you say that it would be unnecessary?"

A. Because the objective of our study was not to diagnose electromagnetic hypersensitivity but to accomplish the far more difficult and expensive objective of establishing the existence of the neurological syndrome. Having established that such a syndrome exists, it now becomes the responsibility of clinicians to formulate diagnostic guidelines. Such efforts are underway at institutions around the world. See Exhibit 2 at No. 4, 12, 30, 52, 59, 125, 126, 127, 135, 136, 137, 138, and 19.

After guidelines are developed and put into effect, the result will be a system to diagnose hypersensitivity in specific subjects. I anticipate that the guidelines will include some form of a provocation test, like the RAST for allergies. But as with allergies, the diagnosis will be based on the treating physician's experience and personal observations of the particular patient in relation to the general guidelines, not on an objective scientific study such as the one done by colleagues and me.

The Complainants

Q. Why is the exposure of the Complainants to the electromagnetic energy from smart meters unreasonable?

A. Maria Povacz, Laura Sunstein Murphy, Diane Van Schoyck, and Cynthia Randall all suffer from serious diseases, disorders, and somatic symptomatology. They report that some of their present symptoms are caused by the electromagnetic energy from smart meters, and they express concerns that their present disease conditions are likely to be worsened by exposure to the electromagnetic energy emitted by smart meters. There is a sound basis in experimental biology that supports their concerns regarding the consequences to their health that have occurred and that may occur due to future chronic exposure to the electromagnetic energy emitted by smart meters. Under the conditions pertinent to the conditions of this case, coercing the Complainants to endure these risks and uncertainties is unwarranted, unjustified, and would amount to involuntary human experimentation by PECO. For all these reasons individually and especially taken together, it would be unreasonable to forcibly expose the Complainants to smart-meter electromagnetic energy.

Q. What serious disease and disorders are you referring to and how are they linked to the electromagnetic energy from smart meters?

A. I will answer with respect to the Complainants individually. For purposes of this report, I am assuming that all of the facts referenced herein will be proved by the Complainants through testimony, records, or otherwise.

Diane Van Schoyck

Diane has a clinically demonstrated hypersensitivity to sound. She suffers from hypothyroidism, spinal stenosis, aortic valve regurgitation, and hypertension. In 2015, PECO installed a smart meter on the home. Shortly thereafter she reported to PECO that she experienced various symptoms including chest pressure and heart palpitations, and was treated by a cardiologist for her condition.

Diane reported additional symptoms to PECO: heart palpitations, insomnia, extreme fatigue, anxiety, skin rashes, flushing, memory concentration difficulty, shortness of breath, hearing buzzing and other ill-defined sounds, dry eyes, and teeth sensitivity. After PECO installed a new AMI smart meter on the home her symptoms continued including sinus infections, lack of sleep, fatigue, and loss of libido, symptoms of chest tightness, teeth pain, and back pain. When PECO's smart meter was replaced with an analog meter her symptoms improved markedly.

Diane's symptomatology, considered in the context in which it occurred, may have been caused by exposure to smart-meter electromagnetic energy. It is possible that the meter emissions led to the symptoms. In my opinion, as a person who has studied public health generally and health risks of electromagnetic energy specifically, the only reasonable course of action is to defer to the recommendation of her physician. If one or more of her treating physicians recommend that she not be exposed to the electromagnetic energy, then that judgment should be accepted by PECO. It is the responsibility of a

physician to diagnose and treat disease and their symptoms, not to conduct experiments to determine what caused those conditions. The treatment and advice rendered to a patient by a physician is governed by a consideration of the best interests of the patient. In my opinion, if a competent physician considers Diane's history, signs, and symptoms and recommends that she not be exposed to the energy, PECO should be bound by that judgment, even if PECO denies the existence of a causal link between Diane's symptomatology and electromagnetic energy

Cynthia Randall

Cynthia was treated for Stage II breast cancer and comes from a family with the BRCA1 gene. She also had kidney cancer and skin cancer, underwent multiple gynecologic procedures for cervical dysplasia during the past 20 years, and suffers from a chronic viral infection. Recent clinical testing raised the possibility that she might be developing psoriatic arthritis. She has been advised by her physician to avoid exposure to electromagnetic energy.

Cynthia is justifiably concerned about the health risks of a smart meter because she has a long history of cancer, and there is strong evidence in the peer-reviewed scientific literature indicating that man-made electromagnetic energy causes stress, and that added stress is strongly counter-indicated in all persons suffering from cancer for the reason that stress initiates complicates and/or exacerbates disease. See Exhibit 2 at No. 2 7, 14, 15, 17, 25, 28, 35, 37, 38, 39, 40, 41, 42, 44, 48, 51, 53, 54, 71, 81, 82, 93, 103, 105, 106, 107, 108, 109, 111, 114, 115, 116, 117, 118, 119, 130, 131, and 140. In the face of the

existing scientific literature and the recommendations of treating physicians, it would be unreasonable for PECO to force Cynthia to undergo chronic exposure to the energy emitted by its smart meters.

Laura Sunstein Murphy

Laura has been hypersensitive to fluorescent lights since 1972. A smart meter was installed on her home in 2002, but she was not made aware that the meter was a source of electromagnetic energy. Soon thereafter, and continuing for the next 14 years, she developed a long list of symptoms and medical problems, including diverticulitis, hypothyroidism, uterine fibroids, atrial fibrillation, ptosis, aortic-valve regurgitation, mitral-valve prolapse, detached retina, severe leg pain. vein ablations, cataracts, severe sinus infection, colon resections, and lipedema, endometrial lesions, vitamin malabsorption, and anemia. In 2015, during litigation occasioned by her refusal to allow installation of a new smart meter, she learned that the original meter had been emitting electromagnetic energy for the past 14 years. For the first time, she took many specific steps to reduce her exposure to the electromagnetic energy but her discomfort continued. Her symptomatology improved when the smart meter was replaced by an analog meter; she felt better, the pains in her legs eased, she was able to stand and walk for longer periods of time, and her headaches stopped. Her symptoms suddenly returned, and after an investigation she learned that PECO had reinstalled a smart meter. After it was once again removed and replaced by an analog meter, her health again began to improve.

In my opinion there is enough scientific information and diagnostic capability to sustain the judgment that Laura symptoms were triggered by smart-meter energy. It is sad that a lay person such as Laura is forced to try to conduct experiments and prove by an excessively high evidentiary standard that a link exists between her symptoms and PECO's smart meter. The striking reality to me is that the remedy Laura seeks seems be a small burden for PECO but a large benefit to her. It is not my intention to opine directly on PECO's burden, but rather to recognize that there are health-related costs associated with the use of smart meters. My opinion is that the state of the science, the context of her symptoms, and opinions of her physician, and the reasonableness of the solution she seeks, taken together, indicate that she should not be forced to chronically endure exposure to smart-meter energy in her own home.

Scientific studies can and have shown the existence of electromagnetic hypersensitivity, but they cannot provide a clinical diagnosis, which is the excusive province of the diagnosing physician. A diagnosis is an algorithmic approach to a disease or disorder that has been formulated by specialists in the different relevant areas of clinical medicine, and adopted by consensus. Clinicians cannot presently diagnose electromagnetic hypersensitivity in accordance with any consensus algorithm because none has yet been developed. But even in the absence of a universally established algorithm for a diagnosis, all clinicians have an ethical responsibility to guide and warn their patients, and to err on the side of patient safety. In the present cases, since a

physician supports her position, it seems unimaginable that PECO would be permitted to ignore that advice, to Laura's determent.

Maria Povacz

In 2012, shortly after PECO installed a new smart meter about ten feet from her bedroom, Maria began to hear ringing in her ears. Other symptoms then developed including sleep deprivation, headaches, chest pains, dizziness, inability to concentrate, thyroid problems and disorders in vitamin metabolism. She took numerous steps to reduce her exposure to electromagnetic energy, but these measures were not sufficient in relieving her discomfort. In 2014, she was clinically diagnosed with electromagnetic hypersensitivity syndrome. When she travelled abroad, she felt much better. When she returned home, her symptoms resumed.

Maria's case echoes the unfairness that results from failure to respect the recent scientific and clinical developments regarding electromagnetic hypersensitivity. Maria can do no more than she has done to explain what has happened to her body in relation to smart-meter electromagnetic energy. She knows that there are many sources of such energy in the modern world, and that in all likelihood she will still be faced with challenges after the present matter is resolved. Even so, the link between smart-meter energy and her medical condition is sufficiently strong that is reasonable for her to avoid such exposure and unreasonable for PECO to mandate it.

Q. Why would exposure of the Complainants in this case to the electromagnetic energy from smart meters be involuntary human experimentation?

A. Human experimentation is the testing of a scientific hypothesis in an experiment that involve human subjects. If the subjects have not given their written informed consent, the experimentation is involuntary. In my opinion, that is exactly what PECO is doing.

Q. Are their official rules for human experimentation?

A. Yes. They developed after World War II and became codified in federal law in 1976.

Q. What are these rules?

A. Perhaps the best way to answer the question would be to describe how they presently function. There are presently about 800 institutions in the United States, more or less, where human research may be lawfully performed. Assume that investigators at one of these institutions wanted to expose human subjects to the electromagnetic energy from smart meters. The investigators would be required to apply to the institution's research board for human research (IRB) for permission to do the study. The backgrounds of the members of the IRB are specified by law, as are the extensive procedural rules that must be followed. Principal among them are the requirements that the investigators provide a written description of exactly what they plan to do, and that they secure written

informed consent from each volunteer in the study, using a form specifically approved by the IRB in which full disclosure is made regarding all aspects of the study, especially including the risks. It is not legally possible to claim that there are no risks. It is also not legally possible for investigators to conduct a study without following these rules.

PECO is intentionally exposing human subjects to the electromagnetic energy from smart meters, which is something that cannot be done by any research institution in the United States without first securing permission and consent within the context of federal laws. The upshot is a Kafkaesque situation in which *bona fide* investigators cannot study the risks of smart-meter electromagnetic energy unless they follow stringent rules, especially the rule involving consent, and yet PECO can involuntarily expose human subjects in the absence of any oversight whatsoever. Equally disturbing, PECO has not disclosed any plan to collect health data as it tests its hypothesis that exposure to its energy is safe, an omission that guarantees PECO will never find evidence of adverse effects.

Q. Have you personally had any experience with the IRB?

A. All of my human studies were approved by my institution's IRB, I served as a member of the IRB for ten years, five years as its chairman.

PECO Experts

Q. Have you read the curriculum vitae of Dr. Mark Israel?

A. Yes.

Q. What is his specialty?

A. He is a pediatrician with a sub-specialty in oncology.

Q. Is he also an experimental biologist?

A. Yes. He has co-authored many peer-reviewed publications in his area of expertise.

Q. What is his area as assessed from his publications?

A. The biochemistry and molecular biology of cancer.

Q. Did you find any evidence to suggest that he has worked in the area of experimental biology that deals with the biological effects on electromagnetic energy?

A. No

Q. Have you read Dr. Israel's testimonies dated May 18, 2016 and May 20, 2016?

A. Yes.

Q. What do you understand his conclusion to be?

A. That neither Maria Povacz nor Laura Sunstein Murphy have been harmed by PECO's smart meters, and that neither of them will be harmed in the future.

Q. What do you understand to be the bases for these conclusions?

A. His conclusion that the Complainants have not been harmed was based on his medical evaluation of the testimony of the Complainants.

Q. What was the basis of his conclusion that the Complainants will not be harmed in the future by electromagnetic energy from smart meters?

A. The basis appears to be a medical evaluation of a literature review that he conducted regarding the biological effects of electromagnetic energy.

Q Do you know him to be a worker in the field of biological effects of electromagnetic energy?

A. No. As best I can tell, he became seriously interested in the area at about the time this litigation commenced.

Q Do you have any opinion regarding his "medical evaluation" of the Complainants?

A Dr. Israel uses the term "medical evaluation" equivocally. At times he seems to employ the orthodox meaning, that of a conclusion of a treating

physician, but he is not a treating physician bound by ethical duty to advance the best interest of the patient.

Q. What other way does Dr. Israel employ the term?

A. He sometimes employs “medical evaluation” idiosyncratically to mean, judging from context, that he reads the scientific literature dealing with the experimental biology of electromagnetic fields, the epidemiological studies dealing with that topic, and the opinion of various agencies and blue-ribbon committees, and evaluates that literature using his skills as a physician, leading him to opine that the Complainants have not been injured by exposure to smart meters and even in the future they will not be injured by smart-meter energy. When Dr. Israel uses “medical evaluation“ in this sense, to mean the analysis of peer-reviewed scientific publications by a physician who has not actually done research on the subject in question I have a definite opinion, namely that it is ineffective and fruitless. Science and medicine each have rules for generating and recognizing knowledge, and the two systems are different. Confounding the two sets of rules, as he did, is unhelpful and unfortunate, and ultimately impossible. He clearly rejects the idea of electromagnetic hypersensitivity, but he didn’t get to that conclusion by conducting an authoritative scientific analysis of the literature based on familiarity and experience in the area.

Q. In your opinion, how did he reach that conclusion?

A. I cannot tell from his testimony. But I can say with considerable confidence it didn't come from scientific analysis. Then he rationalized his choice by cherry-picking published studies that fit his mindset, particularly the work of Rubin. Dr. Israel's reliance on Rubin was to me the clearest possible indication that he does not know the territory related to the health risks of electromagnetic energy.

Q. Are you familiar with Rubin's work?

A. Yes.

Q. What is your understanding of what he is and what he says about electromagnetic hypersensitivity?

A. He is a psychologist who claims that electromagnetic hypersensitivity is a form of mental illness.

Q. What kind of mental illness?

A. A psychosomatic disorder, by which he seems to mean that the sufferers only imagine that their symptoms are caused by man-made electromagnetic energy.

Q. Does he claim that the symptoms aren't real?

A. No. That's not possible because symptoms are subjective. He acknowledges that the sufferer might actually have symptoms, but he denies the possibility that the symptoms might be caused by man-made electromagnetic energy. He employs the term "idiopathic environmental intolerance" to underscore his point that the trigger is some unknown factor in the environment, except that it can't be manmade electromagnetic energy.

Q. Have you had any contact with Rubin?

A. Not directly. The Bioelectromagnetics Society invited us both to appear at their annual meeting in 2015 and debate the issue of electromagnetic hypersensitivity. I accepted, but Rubin declined, so the debate never took place.

Q. Have you had any indirect contact with him?

A. Following publication of our provocation study, he wrote twice to the journal editor, commenting on what he believed to be errors in our work. We pointed out the errors in his analyses of our work and the entire correspondence was published in the journal See Exhibit 2 at 43 and 50.

Q. Would you explain the relation between your work and his work?"

A. The nominal purpose of his experiments was to find electromagnetic hypersensitivity. But he didn't find it so he concluded essentially that it didn't exist. But in science a negative result is universally acknowledged as having low

probative value, because anybody can find nothing. Special talent or training is not needed. The upshot is that a hundred negative studies can be conclusively refuted by one valid positive result. This is why negative studies are usually not published. Our one study showed that he was wrong to interpret his observations to mean that electromagnetic hypersensitivity did not exist.

Q. In your opinion, why did his studies fail?

A. In Rubin's perspective, the only way to scientifically prove that man-made electromagnetic energy could cause somatic symptoms in self-diagnosed sufferers was to first pick a symptom to be studied. Then, after assembling a group of self-diagnosed sufferers who had that particular symptom, he designed the statistical structure of his study such that the cause/effect link between the energy and the symptom could not be detected unless the symptom was precisely reproducible in each subject during repeated trials, and also in all subjects. This design was a near certain guarantee that he would not find what he professed to be seeking because sufferers are human beings, not machines, and they do not react like machines. Consequently, at the statistical level, Rubin simply averaged away reality, like the man with his feet in a fire and his head in a block of ice who reported that his body temperature was normal, on average.

Q. How did your study differ in this regard?

A. We assumed that any symptoms triggered by the energy we applied would be specific to the subject, rather than universal reactions that were similar

in nature and intensity to the reactions of all true hypersensitivity sufferers. We allowed for the possibility that the same subject could exhibit different symptoms during independent trials. For example, if a sufferer reported knee pain in the first trial, fatigue or weakness in the second, and a headache in the third, we counted the results as three reports of a link between exposure and a hypersensitivity reaction, Rubin would count the reports as a failure to find a link because the symptoms were all different. Finally, we used the experimental subject as her own control. That was the purpose of the sham trials.

Q. You said the subject's symptoms were mild or moderate. Did she have any severe symptoms?

A. Yes. That happened, depending on how long she was exposed and on the level of the electromagnetic energy I applied. But our study was not intended to address the issue of symptom severity, but rather to prove the existence of a causal link between electromagnetic energy and symptoms. To accomplish this objective, it was necessary to conduct a sufficient number of independent trials to be able to show to a statistical certainty that she reported symptoms more often during actual exposure intervals compared with sham intervals, which were the intervals when the energy was not applied. When the symptoms were severe they did not abate for hours, which made it impractical to do the study. During a period of about a week, by trial and error, I learned how low to set the energy level so that her symptoms following a 100-second exposure would abate in less than about 15 minutes. Our identification of that threshold made it possible to

achieve our study objective, but it also precluded us from studying the link between exposure and severe symptoms.

Q. Overall, do you disagree with Dr. Israel's analysis?

A. Yes. I think that Dr. Israel's testimony was polemical not analytical. Essentially he doesn't accept the existence of electromagnetic hypersensitivity. I think his perspective is understandable because the research area involving electromagnetic bioeffects is far from his routine responsibilities as a physician. Nevertheless it is not credible for him to enter this field, make a "medical evaluation," and then ask to be believed because he is a doctor, which is what it seems to me that he did.

Q. Have you read the curriculum vitae of Dr. Christopher Davis?

A. Yes.

Q. What is his specialty?

A. He is an engineer.

Q. Is he also an experimental biologist?

A. No, but his research-related activities have been heavily supported by many industrial and government agencies, and he has co-authored many peer-reviewed publications in his area of expertise.

Q. What is his area of expertize as assessed from his publications?

A. Engineering support. He has assisted investigators studying many different kinds of problems. For examples, the solid-state, viscoelastic, light-transmission, and electrical properties of various materials, and the dynamics of wireless networks.

Q. Did you find any evidence to suggest that he has worked in the area of experimental biology that deals with the biological effects on electromagnetic energy.

A. No

Q. Have you read the testimonies of Dr. Davis dated May 18, 2016 and May 20, 2016?

A. Yes.

Q. What did you understand was the substance of what he said?

A. That smart meters emit electromagnetic energy, that the energy is not unusual, and that the energy is safe because the FCC says so.

Q. Do you agree with what you understood him to say?

A. I agree that smart meters emit energy. I don’t agree with the assertion that the energy is not unusual because, in the context he used it, the claim is misleading.

Q. Why is it misleading?

A. Because what is or is not “unusual” depends completely on the frame of reference. If the symptoms of the Complainants is frame of reference, the energy is unusual because at least some of their symptoms didn’t develop in the absence of the smart-meter energy. If the frame of reference is the natural world as it existed before man-made electromagnetic energy was invented, smart-meter energy is unusual because it is about a billion times stronger than the corresponding natural level, more or less. If the reference frame is the location in the houses of the Complainants where the smart meters will be installed, then it is unusual because the resulting energy at those locations will be about a million times stronger compared with the pre-installation levels, more or less.

Q. Why do you disagree with Dr. Davis’s testimony concerning the FCC?

A. Because it is misleading. According to the FCC, smart meters and cellphones are safe when manufactured according to the presently mandated emission levels. But the FCC defines an emission level as “safe” if it doesn’t result in adverse biological effects caused by heating or cooking of the exposed subject. Nowhere does the FCC say that smart meters are safe with regard to physiological changes cause by physical processes other than heating or cooking. That claim is unsupportable and counter-scientific, and has not been made by the FCC. Dr. Davis’s testimony is pregnant with the notion that the FCC says smart meters are safe with respect to all possible mechanisms, which is not the case.

Q. Dr. Davis testified that he agrees with the FCC statement on its website that adverse biological effects from non-thermal exposure levels of electromagnetic energy are ambiguous and unproven. Do you agree?

A. I am familiar with what the FCC means by “ambiguous” and “unproven, with the legal context that governs its jurisdiction, with the extent to which the experiments the FCC is required by law to consider are specifically designed to create ambiguity, and with the overwhelming economic and sociological consequences if the FCC were to say otherwise. In my opinion, in the context of this case, the FCC issue is a red herring.

Q. Dr. Davis testified that installation of a smart meter wouldn’t increase the amount of electromagnetic energy in the house where it was installed. Do you agree?

A. No. When electromagnetic energy is created at a specific location, the laws of physics almost always require that it add to, not cancel, any preexisting electromagnetic energy. There are exceptions, but they do not apply to context relevant this case.

Q. Dr. Davis testified that there have been many reports by expert panels whose consensus is that there is no consistent, reproducible evidence that electromagnetic energy causes any biological effects. Do you agree?

A. Yes, but considering the purpose for which he offered the testimony, it is extremely misleading.

Q. What do you mean, why is it misleading?

A. The thrust of his testimony is to assert that all experts agree that man-made electromagnetic energy in environment, including but not limited to smart meters, doesn't cause any biological effects. I know or have known many such experts, perhaps most, either personally or by reading their publications, and I can say without any qualification that their consensus is the opposite of the one Dr. Davis has asserted. Even more counterfactual, Dr. Davis trusts that the experts on the panels he cited were disinterested, but historically that has almost never been the case.

Q What do you understand to be Dr. Davis's testimony regarding the possibility that smart meters can cause human disease or trigger hypersensitivity reactions?

A. I believe he conceptualizes that the only possible biological effects from man-made electromagnetic energy occur by means of heating or cooking tissues. Since smart meters can't cause those effects, they must be safe.

Q. Do you agree with him?

A. No, because his premise is wrong. There is a very large data base of empirical studies in experimental biology that demonstrates beyond reasonable doubt that biological effects can occur at levels of man-made electromagnetic energy actually present in the environment

Q. What do you understand to be Dr. Davis's testimony regarding his measurements of man-made electromagnetic energy actually present in the environment, including levels produced by smart meters.

A. I believe he conceptualizes that the results of brief, spatially and temporally localized measurements at particularly chosen locations can adequately characterize the electromagnetic environment of the homes of the Complainants, and he did so to in a manner that, at least on the surface tends to trivialize the concerns of the Complainants.

Q. Do you agree with him?

A. No. His testimony in this regard was highly misleading.

Q. In what way?

A. In two ways. He testified that the electromagnetic energy from PECO 's smart meter in Ms. Povacz was 246 times smaller than the level in New Hope, PA. But that comparison was strongly dependent on the locations of the measurements. If he made the measurements at different locations from the smart meter and at different locations in New Hope, he could easily have found that the level in Ms. Povacz house was 246, or even 2046, times greater than the level in New Hope. A meaningful comparison of ambient levels is extremely difficult. Dr. Davis didn't even come close to accomplishing this task. Second, I think that Dr. Davis's testimony created the false impression that time is not a material factor in an attempt to establish a comparison. At virtually all

representative points in the general environment, the actual levels of man-made electromagnetic energy vary over extremely wide ranges. A variation of 1,000,000% would not be unusual, and a variation of 1,000% would be extremely common. In so far as I could determine, Dr. Davis did not consider this factor.

Q. What do you understand to be Dr. Davis's testimony regarding the relation between how much of a change in the existing level of electromagnetic energy caused by smart meters must occur before the matter of health risks is raised?

A. I understood him to mean that if the PECO energy levels were low compared with some reference value then the PECO energy wouldn't matter from a health perspective.

Q. Do you agree with him?

A. No. I understand his perspective. He is an engineer and his professional activities involves working with what are called linear systems, by which I mean things that follow laws whereby if a little change does something, then a change ten times as much will do ten time more. Virtually every system in the world of an engineer works that way. But animals and human beings are nonlinear systems, buy which I mean that their laws can allow things to happen which cannot happen in linear systems. For example, human beings can exhibit very strong responses to very small stimuli in the complete absence of a proportion between the cause and the effect. Dr. Davis's assumption that the stimulus-response relationships of human beings are governed by linear laws is wrong. See Exhibit

2 at No. 84, 88, and 89. Consequently he has no rational basis to argue that PECO's energy is too small to matter.

Opinions of Agencies

Q. In forming the opinions you expressed here, have you taken into consideration the official positions of government agencies regarding safety regulations concerning electromagnetic energy?

A. I know about those positions generally, but for at least two reasons they have not had a significant impact on my opinions. First, their positions are far behind the present state of the science. They are based on out-moded concepts which the independent workers who study the effects of electromagnetic energy that I know do not regard as reasonable. Second, the legal structure of federal law as regards the toxic side-effects of man-made environmental electromagnetic energy effectively requires the agencies to discount the health risks due to man-made electromagnetic energy in the environment.

Q. What legal structure are you referring to?

A. The Radiation Control for Health and Safety Act of 1968. See Exhibit 2 at No 78.

Q. What does that law have to do with the issues in this case?

A. In 1962, following the birth of thousands of armless and legless babies in Europe caused by thalidomide that had been sold to pregnant women, the US Congress required drug companies to provide pre-market scientific evidence of

the safety of new drugs. In 1968, Senator Rogers, of Florida proposed applying the same social principle to devices that emitted man-made electromagnetic energy into the environment. His proposal, The Radiation Control for Health and Safety Act of 1967, would have authorized the government to perform research and regulate the safety of all devices that emitted man-made electromagnetic energy. But opponents of this principle, the industries that manufactured and sold energy-emitting devices, successfully argued that the health impact of man-made electromagnetic energy should be assessed subsequent to marketing. This policy shifted the burden of proof to the party asserting injury and was subsequently adopted by all federal agencies. Each relevant federal agency therefore begins with the assumption of safety, and requires any aggrieved litigant to prove non-safety.

Q. In forming the opinions you expressed here, have you taken into consideration the official positions of private national and international agencies regarding safety regulations concerning electromagnetic energy?

A. I know about their positions generally, but they have not had a significant impact on my opinions because their positions are far behind the present state of the science, and are invariably heavily biased in favor of industry positions. In addition, in all the cases that know about, the decisions of the agencies were star-chamber processes in which those with opposing views were excluded.

Q. Is it your opinion that the only ethical basis for assessing the health risks of electromagnetic energy from devices such as smart meters is knowledge gained from animal studies?

A. Yes, at least with regard to prospective studies.

Q. What do you mean?

A. We suspect that the energy from such devices is a serious health risk. More definitive studies are needed, but such studies will be expensive, and there is no independent source of funds for independent investigators to perform the needed studies. This vacuum is presently being filled by epidemiological studies, which are retrospective analyses of databases of unfortunate persons who have already died or developed disease. Because of their logical structure, epidemiological studies can never answer the basic questions. But far worse is the fact that industry and government are intentionally relying on such studies to provide an answer. In my view, that intention amounts to an egregiously unacceptable form of involuntary human experimentation.

Q. Are the needed animal studies being performed?

A. No. In the US, pursuant to the policy that established by the Radiation Control Law in 1968, such studies are generally regarded a private responsibility. There are no sufficient funds for independent investigators to carry out such studies.

Conclusion

Q. What are your conclusions?

A. First, here is a reasonable basis in established science for the Complainants' concern regarding risks to human health caused by man-made electromagnetic energy in the environment, including the type of electromagnetic energy emitted by smart meters. These health risks are heightened in the very young, the very old, and in those with preexisting diseases or disorders.

Second, electromagnetic hypersensitivity is a documented neurological condition in which the affected person experiences musculoskeletal, immunological, and/or neurological symptoms that noticeably flare or intensify upon exposure to man-made electromagnetic energy in the environment. About 5-10% of the general public are self-reported to suffer from this disorder.

Third, the Complainants were forced into the almost impossible position of conducting experiment on themselves to prove to PECO's satisfaction that their claims of a link between their symptoms and electromagnetic energy from smart meters were sufficiently credible as to warrant some remediable action by PECO.

Fourth, there is no justifiable reason for PECO to doubt the reality of the Complainants' symptoms, to question their intentions in seeking relief, or to not respect and implement the advice they received from their physicians that exposure to smart-meter energy should be avoided.

Fifth, chronic exposure to the electromagnetic energy from smart meters causes risks to human health that go far beyond the capability of the energy to trigger hypersensitivity reactions in sensitive persons. A large literature in

experimental biology indicates that man-made electromagnetic energy, including that from smart meters, causes biological effects involving every essentially physiological process that occurs in living organisms. A large literature in nonexperimental biology shows that man-made electromagnetic energy, including that from smart meters, is associated with a plethora of human diseases. People who suffer from pre-existing conditions are particularly vulnerable, and all the Complainants suffer from such conditions.

Sixth, PECO's claim that the FCC has pronounced smart meter safe is spurious because the FCC has made that statement only with regard to the heating and cooking effects of electromagnetic energy. The Complainants have made no claims that smart meters are like microwave ovens.

Seventh, PECO has claimed that expert committees have pronounced smart meters safe, but PECO has not acknowledged the blatant conflicts-of-interests that infect such committees nor the serious limitations on their reports, such as the failure to address much of the relevant literature.

Eighth, PECO proposes to expose human beings to smart-meter electromagnetic energy over their objection under conditions that would not be acceptable to any institution in the United States where human experimentation can lawfully be performed. Consequently, coercing the Complainants to endure the risks and uncertainties of such exposure is unwarranted, unjustified, and would amount to involuntary human experimentation by PECO.

Exhibit 1

CURRICULUM VITAE

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EDUCATION

Ph.D., Biophysics, Syracuse University, Syracuse, NY, 1968

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POSITIONS HELD

Research Biophysicist, Veterans Administration Medical Center, Syracuse, New York, 1964-1981

Assistant Professor, Department of Orthopaedic Surgery, SUNY Upstate Medical Center, Syracuse, New York, 1972-1981

Assistant Professor, Department of Orthopaedic Surgery, Louisiana State University Medical Center, Shreveport, Louisiana, 1981-1985

Associate Professor, Department of Orthopaedic Surgery, Louisiana State University Medical Center, Shreveport, Louisiana, 1985-1989

Professor: Department of Neurology, Louisiana State University Health Sciences Center, Shreveport, Louisiana, 2010 to 2014

Department of Cellular Biology and Anatomy, Louisiana State University Medical Center, Shreveport, Louisiana, 1989 to 2014

Department of Orthopaedic Surgery, Louisiana State University Health Sciences Center, Shreveport, Louisiana, 1989-2010

Manager: ABR Analytics, 2014 to present

BAR MEMBERSHIP:

New York, 1975-present

Louisiana, 1995-present

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Exhibit 2

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