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COMMONWEALTH OF PENNSYLVANIA  
PUBLIC UTILITY COMMISSION

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:  
Letter of Notification of Philadelphia :  
Electric Company :  
Relative to reconstructing and : Docket No.  
rebuilding of the existing 138 kV line : A-110550F055  
to Operate as a Woodbourne-Heaton 230 :  
kV line in Montgomery and Bucks Counties: :  
:  
Further Hearings. :  
:  
----- X

Pages 1697 through 1719 Hearing Room No. 1  
State Office Building  
Philadelphia, Pennsylvania

**DOCUMENT  
FOLDER**

Monday, June 1, 1993

Met, pursuant to notice, at 10:00 a.m.

**BEFORE:**

HERBERT SMOLEN, Administrative Law Judge

**APPEARANCES:**

PAUL R. BONNEY, Esquire  
WARD L. SMITH, Esquire  
2301 Market Street  
Philadelphia, Pennsylvania 19101  
(For Philadelphia Electric Company)

TOM WATSON, Esquire  
Crowell & Moring  
1001 Pennsylvania Avenue N.W.  
Washington, D. C. 20004  
(For Philadelphia Electric Company)

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Commonwealth Reporting Company, Inc.  
700 Lisburn Road  
Camp Hill, Pennsylvania 17011

## APPEARANCES (CONTINUED):

PATRICIA KRISE BURKET, Esquire  
P. O. 3265  
Harrisburg, Pennsylvania 17120  
(For Law Bureau Prosecutory Staff)

CHARLES F. HOFFMAN, Esquire  
Room 210, North Office Building  
Harrisburg, Pennsylvania 17120  
(For the Office of Trial Staff)

TANYA McCLOSKEY, Esquire  
DIANNE E. DUSMAN, Esquire  
1425 Strawberry Square  
Harrisburg, Pennsylvania 17120  
(For the Office of Consumer Advocate)

ROBERT J. SUGARMAN, Esquire  
100 North 17th Street  
Philadelphia, Pennsylvania 19103  
(For Intervenors, PAUSE)

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**Commonwealth Reporting Company, Inc.**

700 Lisburn Road  
Camp Hill, Pennsylvania 17011

(717) 761-7150

1-800-334-1063

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WITNESSES	DIRECT	CROSS	REDIRECT	RECROSS
Edward Paul Gelmann				
By Mr. Smith	1700	--	1716	--
By Ms. Sugarman		1702	--	--

E X H I B I T S

NUMBER	FOR IDENTIFICATION IN EVIDENCE		
Philadelphia Electric Company			
<del>Direct</del> on Remand No. 5 (Gelmann)	1700		1701

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## P R O C E E D I N G S

1  
2 ADMINISTRATIVE LAW JUDGE HERBERT SMOLEN: On the  
3 record.

4 This is a further hearing in the remanded docket  
5 A-110550, Folder 055.

6 Are we ready to proceed with a witness?

7 MR. SMITH: Yes, Your Honor.

8 JUDGE SMOLEN: Please call a witness.

9 MR. SMITH: The company calls as its first witness  
10 Dr. Edward Gelmann.

11 Whereupon,

12 EDWARD PAUL GELMANN

13 having been duly sworn, testified as follows:

14 JUDGE SMOLEN: Please state your name and business  
15 address.

16 THE WITNESS: Edward Paul Gelmann, G-E-L-M-A-N-N,  
17 Georgetown University, 3800 Reservoir Road, Northwest,  
18 Washington, D. C. 20007.

19 JUDGE SMOLEN: Counsel.

20 MR. SMITH: Your Honor, we have already distributed  
21 to yourself, Counsel and to the court reporter copies of  
22 a document marked PECO Direct on Remand No. 5, direct  
23 testimony on remand of Edward Paul Gelmann on behalf of  
24 Philadelphia Electric Company. We ask that that document  
25 be marked for identification.

1 JUDGE SMOLEN: So marked as you have referenced it,  
2 PECO Direct on Remand No. 5, the direct testimony on  
3 remand of Edward Paul Gelmann.

4 (Whereupon, the document was marked  
5 as PECO Direct on Remand No. 5  
6 for identification.)

7 DIRECT EXAMINATION

8 BY MR. SMITH:

9 Q. Dr. Gelmann, do you have before you a copy of  
10 the document that has just been marked for identification  
11 as PECO Direct on Remand No. 5?

12 A. I do.

13 Q. Was this document prepared by you or under your  
14 direct supervision?

15 A. Yes.

16 Q. If I were to ask you today the questions set  
17 forth in that document, would your answers be the same as  
18 those contained therein?

19 A. They would.

20 Q. And would your answers be true and correct to  
21 the best of your knowledge, information and belief?

22 A. They would.

23 MR. SMITH: Your Honor, I ask that PECO Direct on  
24 Remand No. 5 be admitted into the record subject to  
25 timely objections and cross-examination.

JUDGE SMOLEN: It is so admitted subject to that

1 qualification.

2 (Whereupon, the document marked as  
3 PECO Direct on Remand No. 5  
4 was received in evidence.)

5 MR. SMITH: And the witness is available for  
6 cross-examination.

7 JUDGE SMOLEN: Law Bureau.

8 MS. BURKET: No questions, Your Honor.

9 JUDGE SMOLEN: Mr. Dillon is not here today?

10 MS. BURKET: No. He is not here.

11 JUDGE SMOLEN: All right.

12 Mr. Hoffman.

13 MR. HOFFMAN: Your Honor, I think OTS's position is  
14 clear on the record. We would have quite a bit of  
15 cross-examination for Dr. Gelmann if we had been  
16 permitted to prepare our case properly. As such there is  
17 no point for us to do it now. So we will await hopefully  
18 a favorable ruling from the Commission --

19 JUDGE SMOLEN: All right.

20 MR. HOFFMAN: -- on our petition.

21 JUDGE SMOLEN: Yes.

22 OCA.

23 MS. DUSMAN: The OCA has no cross for Dr. Gelmann,  
24 Your Honor.

25 JUDGE SMOLEN: Mr. Sugarman.

MR. SUGARMAN: Yes. Thank you, Your Honor.

## CROSS-EXAMINATION

1  
2 BY MR. SUGARMAN:

3 Q. Dr. Gelmann, is your research into the  
4 mutational analyses or your mutation analysis, does it  
5 deal with the potential or the study of alterations in  
6 magnetic fields and their effects on the functioning of  
7 the brain?

8 MR. SMITH: Objection, Your Honor. It assumes that  
9 those effects exist and have been proven.

10 MR. SUGARMAN: Well, I thought I said possibility.

11 JUDGE SMOLEN: Let's hear the question again before  
12 I make a ruling. The reporter can read it back.

13 (Whereupon, the reporter read from the record as  
14 requested.)

15 JUDGE SMOLEN: Well, I am going to sustain the  
16 objection and let you rephrase.

17 MR. SUGARMAN: I will rephrase it.

18 BY MR. SUGARMAN:

19 Q. Did you study whether magnetic fields have an  
20 impact on the functioning of the brain as part of your  
21 mutational analysis?

22 MR. SMITH: Objection, Your Honor. That is outside  
23 the scope of the --

24 JUDGE SMOLEN: Overruled.

25 A. The testimony that I have given today deals

1 with -- the only way it would deal with the brain would  
2 be regarding carcinogenicity. Other aspects of the  
3 functioning of the brain would not be within the  
4 information that I described.

5 BY MR. SUGARMAN:

6 Q. Are you familiar with the work that was  
7 presented last week to the American Geophysical Union in  
8 Baltimore, in which a team of researchers was able to  
9 trigger seizures in two epilepsy patients by exposing  
10 their heads to a weak magnetic field?

11 MR. SMITH: Objection, Your Honor. He is reading  
12 evidence in from a newspaper article.

13 MR. SUGARMAN: It just got published yesterday in  
14 the Philadelphia Inquirer of May 31st, 1993.

15 MR. SMITH: That is my point. It is the  
16 Philadelphia Inquirer.

17 MR. SUGARMAN: The Commission says we are to check  
18 into the latest studies, and this is the latest study.  
19 And this is the only source that exists, being as today  
20 is June 1st.

21 JUDGE SMOLEN: Counsel's, that is, Mr. Sugarman's  
22 question is not evidence. The mere fact that he asked a  
23 question does not necessarily -- it's not a question of  
24 it does not necessarily. It is not evidence.

25 Now, the question is is this witness familiar with

1 that particular study? Is that your question?

2 MR. SUGARMAN: Yes, Your Honor.

3 JUDGE SMOLEN: Just with that particular study, are  
4 you familiar with it? You may answer.

5 THE WITNESS: No.

6 JUDGE SMOLEN: And the answer is -- I'm sorry.

7 THE WITNESS: The answer is no.

8 BY MR. SUGARMAN:

9 Q. If there were a showing that magnetites in the  
10 body would be a mechanism through which electromagnetic  
11 fields would affect the functioning of cells, would that  
12 show up in any of your studies of mutational analysis or  
13 chromosome studies?

14 A. The effect on the functioning of cells by  
15 magnetic fields would partly show up in the review of the  
16 studies described under the mutational and the chromosome  
17 and partly under the other studies that I have described.

18 Q. And have you studied the potential for  
19 alteration of cells or subsets of cells through the  
20 interaction of magnetic fields and magnetites in the  
21 body?

22 A. Not as part of this testimony, but previously I  
23 have read some papers that have touched on that subject.  
24 I have not done an exhaustive review of it because it is  
25 somewhat outside the area of my expertise.

1 Q. In reaching your opinion that the extensive --  
2 well, on line 20, page five, that scientific research  
3 provides no basis to conclude that power frequency fields  
4 cause, promote or otherwise contribute to the development  
5 of cancer or other adverse health effects, does that  
6 opinion include a consideration of the scientific  
7 research into the impact of the interaction of  
8 electromagnetic fields and the magnetite in the body?

9 A. The conclusions of my previous testimony did  
10 take into account at least one study on magnetite. It  
11 was not an exhaustive review of the field. The current  
12 testimony did not include any new information on that and  
13 does not include anything that occurred yesterday or was  
14 reported today in the Philadelphia Inquirer.

15 Q. Well, it says it occurred last week and was  
16 reported in yesterday's Inquirer.

17 A: "I'm not familiar with. I'm not familiar with  
18 the field levels or anything else.

19 Q. I understand.

20 MR. SMITH: Your Honor, a point of clarification.  
21 I thought that Mr. Sugarman said that the original study  
22 had something to do with something other than magnetites  
23 and now he is talking about a magnetite study. It is  
24 unclear because we don't have the article whether that  
25 magnetite article also was supposed to have been reported

1 last week.

2 MR. SUGARMAN: Well, it is not clear if the  
3 researchers produced a written document. What the  
4 article says is that they spoke at the American  
5 Geophysical Union meeting in Baltimore last week. The  
6 summary of it states, "A team of researchers has been  
7 able to trigger" --

8 MR. SMITH: Your Honor --

9 JUDGE SMOLEN: Well, Mr. Sugarman, we are getting  
10 close to testimony and we don't want to have that.

11 MR. SUGARMAN: All right.

12 JUDGE SMOLEN: That extra-judicial testimony.

13 MR. SUGARMAN: I would request that the record be  
14 held open to supplement, to deal with this scientific  
15 study which has just occurred and which may be relevant  
16 and which has apparently not been considered at this  
17 point.

18 JUDGE SMOLEN: Well, do you intend to present a  
19 witness on that? You have made a request to hold the  
20 record open. I am asking are you going to put a witness  
21 in on it?

22 MR. SUGARMAN: I have already stated, and I guess I  
23 should put on the record, that my clients do not have the  
24 financial resources to retain at the prices that are  
25 available a witness to do this again. And so I am

1 looking for the Commission to protect the public through  
2 its Law Bureau. I notice Ms. Burket is still sitting on  
3 the opposition side. But I am requesting that the Law  
4 Bureau review this and the OTS and the OCA so that the  
5 public interest can be protected by the Public Utility  
6 Commission since my clients have exhausted their  
7 financial capabilities.

8 JUDGE SMOLEN: That is your request and that is  
9 made of record.

10 MR. SMITH: My response to that, briefly, Your  
11 Honor, is that requests should go to the Commission, in  
12 our opinion, and not to the Administrative Law Judge.

13 JUDGE SMOLEN: All right. That is your opinion.

14 MR. SUGARMAN: We have submitted it to the  
15 Commission through our response to the OTS request for  
16 reconsideration.

17 JUDGE SMOLEN: He has not requested the  
18 Administrative Law Judge to do anything. He is  
19 requesting the OTS, Law Bureau and OCA in connection with  
20 his previous remarks regarding this address at the --

21 MR. SUGARMAN: American Geophysical Union.

22 JUDGE SMOLEN: All right. Let's go to the next  
23 question.

24 MR. SUGARMAN: Thank you, sir.

25 BY MR. SUGARMAN:

1 Q. Do you concur that magnetites have been located  
2 within the human body?

3 A. I am not confident enough at this moment in my  
4 recollection of those studies to be able to answer that  
5 question.

6 Q. If magnetite would be -- if you would be  
7 satisfied that magnetite has been established as being  
8 present in the human body, would that satisfy you that  
9 there is a mechanism that is a feasible mechanism for  
10 electromagnetic fields to be related to cancer?

11 A. No.

12 Q. And why not?

13 A. Because the presence of magnetite has nothing  
14 to do with the DNA or the genome.

15 Q. Or the what?

16 A. The genome. G-E-N-O-M-E.

17 Q. Doesn't magnetite have a relationship to the  
18 RNA and the functioning of RNA?

19 A. Not to my knowledge.

20 Q. Now, have you ever studied that?

21 A. I don't understand what you mean.

22 Q. The relationship between magnetite, whether  
23 there is a relationship between magnetite and the  
24 functioning of RNA.

25 A. I have not -- to my knowledge there is none.

1 Q. Well, have you ever studied it?

2 A. What do you mean by studied it? I don't  
3 understand the question.

4 Q. Have you ever done any research in it or made  
5 yourself familiar with the field?

6 A. I'm familiar to the extent of the papers I have  
7 reviewed. I have not done research personally.

8 Q. Are you familiar with any papers that deal with  
9 whether there is a relationship between magnetite and the  
10 functioning of RNA?

11 A. I am not.

12 Q. Do you have any opinion as to whether the  
13 functioning of RNA is related to cancer?

14 A. That is a question that is so broad it is  
15 almost impossible to answer. But RNA in that it is a  
16 critical component of cellular machinery is present and  
17 vital for cancer cells.

18 Q. When you testify here at page five, line 20,  
19 that scientific research provides no basis to conclude  
20 that power frequency fields -- first of all, what do you  
21 mean by power frequency fields? Is that something  
22 different than what we call electromagnetic fields?

23 A. It is the fields that come from the frequency  
24 of powerline transmission as opposed to other  
25 frequencies.

1 Q. Well, does it include electromagnetic fields?

2 A. The fields that are referred to in line 21 are  
3 electromagnetic fields.

4 Q. Also electrical fields? Or just  
5 electromagnetic fields?

6 A. Well, electromagnetic fields are the presence  
7 of an electric field and a magnetic field.

8 Q. And when you say that the scientific research  
9 provides no basis to conclude that these fields cause,  
10 promote or otherwise contribute, what do you mean by the  
11 word conclude?

12 A. I am able to make any sort of a --

13 Q. Synonym for that? Could you make a  
14 distinction? Could you tell me what it does not mean?

15 A. I am trying to answer your question. Give me a  
16 second.

17 Q. Sure.

18 (Pause.)

19 A. I think the words speak for themselves. I have  
20 reviewed the literature and I have reviewed the  
21 additional literature as described in this testimony.  
22 And having reviewed that, that is the conclusion.

23 Q. Let me ask you, taking into account on page  
24 five, lines three to six, you state that, among other  
25 things, the research on EMF remains unclear or uncertain.

1           Your statement that you see no basis to conclude  
2 that power frequency fields cause or promote, is that  
3 consistent with the statement that the research on EMF  
4 remains unclear or uncertain?

5           A. Yes.

6           Q. So would it be fair to say, then, that you  
7 don't see any basis to conclude that power frequency  
8 fields do not cause, promote or otherwise contribute to  
9 the development of cancer?

10          A. No.

11          Q. That's not fair?

12          A. No.

13          Q. Well, if the research is unclear or uncertain  
14 how could you have a basis to conclude that they do not?

15          A. The reviews that are referred to on page five,  
16 lines one through eight are broad-ranging and cover a  
17 wide range of studies both in and outside of my areas of  
18 expertise. The reviews that are referred to in those  
19 lines come to the conclusions based on overall  
20 considerations and their written conclusions have to  
21 encompass all those areas. My comments are restricted to  
22 the areas of expertise as covered in those reviews and my  
23 interpretation of their conclusions is that they do not  
24 find any information that differs from my opinion.

25          Q. But you say that they conclude that the

1 research remains unclear or uncertain, and then you say  
2 in my areas of expertise of oncology, molecular genetics  
3 and cellular biology I agree with that overall  
4 conclusion. So you are agreeing that the research is  
5 unclear and uncertain.

6 MR. SMITH: Objection, Your Honor, on two grounds.  
7 The first is when Mr. Sugarman read from the testimony he  
8 skipped a part of the sentence that Dr. Gelmann's  
9 testimony says he's agreeing with.

10 MR. SUGARMAN: True.

11 MR. SMITH: And secondly, the way that was phrased  
12 was argumentative.

13 MR. SUGARMAN: I will read the whole thing if that  
14 will alleviate the concern.

15 JUDGE SMOLEN: Well, it is starting to become  
16 argumentative. I am going to let Mr. Sugarman go on a  
17 little bit.

18 MR. SUGARMAN: I was trying to focus on it. I  
19 don't know what is cross-examination that questions  
20 apparent inconsistencies and how it avoids being  
21 argumentative, but I'm trying to avoid being  
22 argumentative while still doing reasonable  
23 cross-examination.

24 BY MR. SUGARMAN:

25 Q. It says here, "Both reviews essentially

1 conclude after reviewing the recent research that the  
2 research on EMF remains unclear or uncertain, and that  
3 adverse human health effects of exposure to EMF have not  
4 been demonstrated. In my areas of expertise of oncology,  
5 molecular genetics and cellular biology, I agree with  
6 that overall conclusion."

7 So I take it you agree that the research on EMF  
8 remains unclear or uncertain?

9 A. I don't disagree with their conclusions. From  
10 my review of the literature and in my area of expertise,  
11 there has been no conclusive demonstration of cancer  
12 causing ability or adverse health effects that could be  
13 interpreted as human adverse health effects, and I think  
14 that there is, as I say in lines 20 to 23, no basis to  
15 conclude that power frequency electromagnetic fields  
16 represent a carcinogenic risk or a cause of other adverse  
17 health effects.

18 Q. What I am trying to explore is your  
19 unwillingness to agree with the converse of that  
20 statement, that based on your statement in lines six  
21 through eight how you cannot agree with the statement  
22 that scientific research provides no basis to conclude  
23 that these fields do not cause, promote or otherwise  
24 contribute. If it is uncertain and unclear --

25 A. Because they do.

1 Q. Well, how can they if they are uncertain or  
2 unclear?

3 A. Substantial experiments have been done, have  
4 asked specific questions about adverse health effects and  
5 cancer causation, and there has been no satisfactory  
6 demonstration of cancer causation or effects.

7 Q. Then what is unclear or uncertain?

8 A. The overall -- again, the studies that are  
9 referenced in lines one through eight reviewed the entire  
10 scientific research. That includes epidemiology and  
11 other areas. Because there is no consistency in the  
12 scientific research, that is, there are epidemiologic  
13 studies that have shown or suggested a very slight  
14 increased risk of some specific cancers, there is no  
15 biology that is consistent and there is no theory that  
16 can explain the suggestion that fields may be associated  
17 with that causation, and that is what is unclear.

18 Q. Then I take it you would agree that you cannot  
19 conclude that magnetic fields do not contribute and that  
20 is why you didn't testify to that effect.

21 MR. SMITH: Your Honor, this is asked and answered.

22 JUDGE SMOLEN: It is asked and answered, but I will  
23 give you one more chance at it.

24 BY MR. SUGARMAN:

25 Q. You didn't testify --

1 A. You will have to repeat it.

2 Q. You didn't testify in your written testimony  
3 that the scientific research allows you to conclude that  
4 these fields do not promote or contribute or cause cancer  
5 or other adverse health effects. And I take it that the  
6 reason you didn't do so is the research in your view  
7 remains unclear or uncertain.

8 A. No. That is not my view. It is very hard to  
9 prove a negative. As far as cancer causation goes, I  
10 think there is no basis to conclude that fields cause  
11 cancer and I think there is a strong basis to conclude  
12 that fields do not cause cancer.

13 I think that the phrase other adverse health  
14 effects is a broad one and I was just trying to be fair  
15 and cautious and reasonable. However, I think there is  
16 no basis to conclude, as I have said, that fields cause  
17 other adverse health effects.

18 Q. But you have not been -- you are not including  
19 in that the recent work on magnetites, as you  
20 testified --

21 A. The reference from the Philadelphia Inquirer?

22 Q. Right.

23 A. No. I'm not familiar with that.

24 MR. SUGARMAN: Thank you.

25 No further questions.

1 MR. SMITH: Your Honor, could we have a look at the  
2 Philadelphia Inquirer article?

3 MR. SUGARMAN: Sure.

4 (Document handed to Mr. Smith.)

5 (Pause.)

6 REDIRECT EXAMINATION

7 Q. Dr. Gelmann, do you recall a few moments ago  
8 when you were being asked questions about magnetites and  
9 the human body and its possible relationship to  
10 carcinogenesis?

11 A. Yes. He just asked me some questions about  
12 that.

13 Q. Now, in the studies that you reviewed and  
14 relied upon, assuming that magnetites do exist in the  
15 human body, did any of those cells that were exposed to  
16 magnetic fields in those studies then also have  
17 magnetites in them?

18 A. I don't know the answer to that.

19 Q. Were any of them -- did any of the studies  
20 attempt to remove magnetites from the cells?

21 A. No.

22 Q. Based on your professional experience do you  
23 have any reason to believe that magnetites are related to  
24 the process of carcinogenesis?

25 A. No.

1 MR. SMITH: No further questions.

2 JUDGE SMOLEN: Anything further of the witness?

3 MR. SUGARMAN: No, Your Honor.

4 JUDGE SMOLEN: Mr. Sugarman has indicated in the  
5 negative.

6 OCA?

7 MS. DUSMAN: No, Your Honor.

8 JUDGE SMOLEN: Law Bureau?

9 MS. BURKET: No, Your Honor.

10 JUDGE SMOLEN: And Trial Staff previously made its  
11 statement.

12 Anything further of the witness?

13 (No audible response.)

14 JUDGE SMOLEN: Hearing no response, this witness is  
15 excused. Thank you very much for appearing and  
16 testifying.

17 (Witness excused.)

18 JUDGE SMOLEN: Are there any other matters, any  
19 other testimony to be offered today?

20 (No audible response.)

21 JUDGE SMOLEN: Hearing no response from anyone,  
22 that should wind up the presentation of the testimony so  
23 far in the remanded proceeding. Now, we have previously  
24 set a briefing schedule and we will follow that briefing  
25 schedule unless, of course, some action by the Commission

1 should alter this schedule and change the original remand  
2 order.

3 Any other comments by anyone else before we adjourn  
4 today's session?

5 (No audible response.)

6 JUDGE SMOLEN: Thank you all for appearing. This  
7 hearing is adjourned and we will look forward to  
8 receiving the briefs and the reply briefs in accordance  
9 with the original schedule.

10 Thank you very much.

11 (Whereupon, at 10:27 a.m., the hearing was  
12 concluded.)

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C E R T I F I C A T E

1  
2 I hereby certify, as the stenographic reporter,  
3 that the foregoing proceedings were taken  
4 stenographically by me and thereafter reduced to  
5 typewriting by me or under my direction; and that this  
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11 *Robert J. Stonaker*  
12 By: \_\_\_\_\_

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COPY

PECO Direct on Remand No. 5

5/1/93 Phila, PA R15

A-110550F055

BEFORE THE  
PENNSYLVANIA PUBLIC UTILITY COMMISSION

DIRECT TESTIMONY ON REMAND  
OF  
EDWARD PAUL GELMANN  
ON BEHALF OF  
PHILADELPHIA ELECTRIC COMPANY

RECEIVED

JUN 3 1993

SECRETARY'S OFFICE  
Public Utility Commission

May 12, 1993

1 DIRECT TESTIMONY OF EDWARD PAUL GELMANN

2 I. Introduction and Background

3 Q. Please state your name and business address.

4 A. Edward Paul Gelmann, 3800 Reservoir Road, N.W., Washington,  
5 D.C.

6 Q. What is your occupation?

7 A. I am a medical doctor, researcher, and teacher, specializing  
8 in medical oncology. I am also Professor of Medicine,  
9 Professor of Anatomy and Cell Biology, and Chief of the  
10 Division of Medical Oncology at the Georgetown University  
11 Medical School.

12 Q. Have you previously testified in this proceeding?

13 A. Yes. I submitted written testimony (PECO Rebuttal Statement  
14 No. 3) in November 1991. My previous testimony addressed  
15 molecular genetics, cellular biology, and cancer and the EMF  
16 research related to those areas.

17 II. Scope of Testimony

18 Q. Dr. Gelmann, what were you asked to do for the remanded  
19 hearings in this proceeding?

20 A. I was asked to review the EMF research in my areas of  
21 expertise and discuss recent developments in those areas. I  
22 was also asked to assess this recent research and provide an  
23 update of my opinion regarding whether power frequency fields  
24 cause adverse genetic, molecular, or cellular effects that  
25 could lead to cancer or other adverse health effects in  
26 humans.

27 III. Recent EMF Research on Molecular Genetics, Cellular Biology,  
28 and Cancer

29 Q. Dr. Gelmann, what recent EMF research on molecular genetics,  
30 cellular biology, and cancer will you address in this  
31 testimony?

1 A. As discussed in my previous testimony, EMF research has been  
2 done using standard types of tests that are conducted to  
3 determine whether an agent causes molecular or cellular change  
4 that can lead to cancer. In that regard, I would like to  
5 discuss recent results of mutational analyses, chromosome  
6 studies, and animal studies. In addition, I would like to  
7 discuss briefly some recently-released scientific reviews of  
8 the EMF research.

9 Q. What is meant by "mutational analyses"?

10 A. Permanent, heritable change to the cell's DNA, or "genetic  
11 material," is essential for normal cells to be transformed  
12 into cancer cells. Mutational analyses are tests that show  
13 whether a permanent change has occurred in the structure of  
14 the DNA molecule as a result of exposure to an agent.

15 Q. What are the results of the recent mutational analyses  
16 involving power frequency electric and/or magnetic fields?

17 A. In my previous testimony, I noted that studies to date  
18 indicated no effects on mutations from EMF exposure. (PECO  
19 Rebuttal Statement No. 3, p. 9) Three recent publications, by  
20 Novelli, et al. (1991), Fiorani, et al. (1992), and Otaka, et  
21 al. (1992) also have reported that exposure to power frequency  
22 electric and/or magnetic fields had no effects on mutations.

23 Q. What do you mean by "chromosome studies"?

24 A. Chromosome studies evaluate whether there are breaks or damage  
25 to the chromosomes as a result of exposure to an agent.  
26 Because chromosomes contain the DNA, these studies provide  
27 information on an agent's potential to cause cancer or other  
28 adverse health effects.

29 Q. What are the results of the recent chromosome studies  
30 involving power frequency electric and/or magnetic fields?

31 A. In one recent study, the researchers exposed human lymphocytes

1 and CHO (mammalian) cells to 60 Hz magnetic fields. Several  
2 different assays showed no effect on chromosomes (Livingston  
3 et al., 1991). In a second study (Ager & Radul, 1992) the  
4 researchers found no effect on chromosomes in cells exposed to  
5 60-Hz magnetic fields alone and no enhancement of chromosomal  
6 damage caused by ultraviolet radiation.

7 Q. What is meant by an "animal study"?

8 A. Animal studies examine the effects of an agent on whole  
9 organisms. Animal studies have a broader potential than  
10 studies on isolated cells to tell researchers about genetic  
11 change or other adverse effects on cells or groups of cells  
12 and whether any such changes are related to an adverse health  
13 outcomes.

14 Q. What are the results of the recent animal studies involving  
15 power frequency electric and/or magnetic fields?

16 A. In much of the recent animal research, the researchers have  
17 exposed whole animals to power frequency magnetic fields in  
18 combination with chemical agents. These studies are intended  
19 to address the question of whether power frequency fields act  
20 as tumor promoters, either by themselves or in combination  
21 with chemical agents.

22 Mevisson et al. (1993), exposed rats to a chemical (DMBA) that  
23 induces mammary tumors, and then exposed subsets of animals to  
24 magnetic fields (including exposing one group to power  
25 frequency fields of 300,000 milligauss and another group to  
26 fields of 3-10 mG). Magnetic field exposure did not increase  
27 the number of animals that developed cancer. There were no  
28 reproducible effects that could be attributed to magnetic  
29 fields.

30 Rannug et al. (1993) treated rats with a chemical (DENA) to  
31 initiate liver (hepatic) tumors, then exposed the animals to

1 a second chemical (phenobarbital) that acts as a hepatic tumor  
2 promotor. Some of the animals were simultaneously exposed to  
3 power frequency magnetic fields. The primary endpoint  
4 measured by the researchers was the number of preneoplastic  
5 liver lesions, or "liver foci." There were no significant  
6 differences in the number of liver foci between the exposed  
7 and unexposed animals.

8 McLean et al. (1991) and Stuchley et al. (1992) reported no  
9 differences in tumor development between mice exposed to DMBA  
10 alone and mice exposed to both DMBA and 20,000 milligauss  
11 power frequency magnetic fields. The researchers also  
12 compared mice exposed to a tumor initiator (DMBA), and a tumor  
13 promoter (TPA), with mice exposed to these two chemicals and  
14 to a 20,000 milligauss power frequency magnetic field.  
15 Although in one experiment transient differences were seen  
16 between exposed and control animals, there was no difference  
17 in tumor incidence between the two groups' final tumor  
incidence.

19 Q. Are there any other studies that you would like to address?

20 A. Yes. In my previous testimony I described the research by  
21 Goodman et al. on protein synthesis and RNA transcription  
22 (PECO Rebuttal Statement No. 3, p. 15, line 23 to p. 16, line  
23 33). I would like to note briefly that Parker and Winters  
24 (1992) attempted to replicate some of these experiments but  
25 were unable to do so.

26 Q. In your previous testimony, you referred to reviews of the EMF  
27 research conducted by the Virginia Department of Health and  
28 the Maryland Department of Natural Resources... (PECO Rebuttal  
29 Statement No. 3, p. 22, line 24 et. seq.) Have new reviews  
30 been released by those agencies?

31 A. Yes. As part of the ongoing monitoring of EMF research in  
32 those states, the Virginia Department of Health released its

1 1992 and 1993 reviews (Wasti, 1992 and Wasti, 1993), and the  
2 Maryland Department of Health released its 1992 review  
3 (Energetics, Inc., 1992). Both reviews essentially conclude,  
4 after reviewing the recent research, that the research on EMF  
5 remains unclear, or uncertain, and that adverse human health  
6 effects of exposure to EMF have not been demonstrated. In my  
7 areas of expertise of oncology, molecular genetics, and  
8 cellular biology, I agree with that overall conclusion.

9 IV. Conclusions Regarding the EMF Research on Cancer and Other  
10 Adverse Health Effects and Regarding Right-of-Way Width  
11 Standards

12 Q. Dr. Gelmann, in your previous testimony you stated your  
13 opinion that: "The extensive research on molecular and  
14 cellular biology and cancer provides no scientific basis to  
15 conclude that power frequency fields cause, promote, or  
16 otherwise contribute to the development of cancer or other  
17 adverse health effects" (PECO Rebuttal Statement No. 3, p. 22,  
18 line 24 to line 27). Based on your review of the recent  
19 research, have you altered that opinion?

20 A. No, it is still my opinion that the scientific research  
21 provides no basis to conclude that power frequency fields  
22 cause, promote, or otherwise contribute to the development of  
23 cancer or other adverse health effects.

24 Q. Dr. Gelmann, does the EMF research in your area of expertise  
25 support a limitation on right-of-way width for transmission  
26 lines?

27 A. No. I see no scientific or medical basis to develop a right-  
28 of-way width standard.

29 Q. Does this conclude your testimony?

30 A. Yes.

References

Ager, D.D. & J.A. Radul, "Effect of 60-Hz Magnetic Fields on Ultraviolet Light-Induced Mutation and Mitotic Recombination in *Saccharomyces Cerevisiae*," 283 Mutation Research 279-286 (1992)

Energetics, Inc., "Status report on potential human health effects associated with power frequency electric and magnetic fields," Report prepared for the Maryland Department of Natural Resources and Public Service Commission of Maryland (1992)

Fiorani, M., O. Contini, P. Sestili, R. Conti, P. Nicolini, F. Vetrano & M. Dacha, "Electric and/or Magnetic Field Effects on DNA Structure and Function in Cultured Human Cells," 282 Mutation Research 25-29 (1992)

Livingston, G.K., K.L. Witt, O.P. Gandhi, I. Chatterjee, J.L. Foti Roti, "Reproductive Integrity of Mammalian Cells Exposed to Power Frequency Electromagnetic Fields," 17 Environ. Molec. Mutagen. 49-48 (1991)

McLean, J.R.N., Stuchley, M.A., et al., "Cancer promotion in a mouse-skin model by a 60-Hz magnetic field: II. Tumor development and immune response," 12 Bioelectromagnetics 273-287 (1991)

Mevissen, M., Stamm, A., S. Buntenkotter, R. Zwingelberg, U. Wahnschaffe & W. Loscher, "Effects of Magnetic Fields on Mammary Tumor Development Induced by 7,12-Dimethylbenz(a)anthracene in Rats," 14 Bioelectromagnetics 131-43 (1993).

Novelli, G., M. Gennarelli, L. Potenza, P. Angeloni & B. Dallapiccola, "Study of the Effects on DNA of Electromagnetic Fields Using Clamped Homogeneous Electric," Field Gel Electrophoresis, 45 Biomed & Pharmacotherapy 451-454 (1991)

Otaka, Y., S. Kitamura, M. Furuta & A. Shinohara, "Sex-Linked Recessive Lethal Test of *Drosophila Melanogaster* After Exposure to 50-Hz Magnetic Fields," 13 (1) Bioelectromagnetics 67-74 (1992)

Parker, J.E. & W. Winters, "Expression of Gene-Specific RNA in Cultured Cells Exposed to Rotating 60-Hz Magnetic Fields," 70 Biochem Cell Biol 237-241 (1992)

Rannug, A., B. Holmberg, T. Ekstrom & K.H., "Mild Rat Liver Foci Study on Coexposure With 50 Hz Magnetic Fields and Known Carcinogens," 14 (1) Bioelectromagnetics 17-27 (1993)

Stuchly, M.A., J.R.N. McLean, R. Burnett, M. Goddard, D.W. Lecuyer & R.E.J. Mitchel, "Modification of Tumor Production in the Mouse Skin by Exposure to an Alternating Magnetic Field," 65 Cancer Letters 1-7 (1992)

Wasti, K., "Monitoring of ongoing research on the health effects of high voltage transmission lines (Seventh Annual Report)," Report prepared by the Virginia Department of Health in cooperation with the State Corporation Commission (1992)

Wasti, K., "Monitoring of ongoing research on the health effects of high voltage transmission lines (Eighth Annual Report)," Report prepared by the Virginia Department of Health in cooperation with the State Corporation Commission (1993)

CERTIFICATE OF SERVICE

I hereby certify that I have this day served a true copy of the foregoing documents upon the following parties and in the manner indicated below in accordance with the requirements of 52 Pa. Code § 1.54:

FAX AND FIRST-CLASS MAIL

Patricia Krise Burket, Esq.  
Pennsylvania Public Utility  
Commission  
North Office Building, G-28  
Harrisburg, PA 17120

HAND-DELIVERED

Robert J. Sugarman, Esq.  
Sugarman & Associates  
Robert Morris Building  
Seventeenth Floor  
100 N. 17th Street  
Philadelphia, PA 191073  
(Counsel for Intervenors)

FAX AND FIRST-CLASS MAIL

Charles F. Hoffman, Director  
Office of Trial Staff  
Pennsylvania Public Utility  
Commission  
North Office Building, Room 210  
Harrisburg, PA 17120

FAX AND FIRST-CLASS MAIL

Jesse Dillon, Esq.  
Pennsylvania Power & Light Co.  
Two North Ninth Street  
Allentown, PA 19101

FAX AND FIRST-CLASS MAIL

Tanya J. McCloskey, Esq.  
Assistant Consumer Advocate  
Office of Consumer Advocate  
1425 Strawberry Square  
Harrisburg, PA 17120

FEDERAL EXPRESS

Thomas Watson, Esq.  
Crowell & Moring  
1001 Pennsylvania Avenue, N.W.  
Washington, D.C. 20004-2505



Ward L. Smith  
Assistant General Counsel  
Philadelphia Electric Company  
2301 Market Street, S23-1  
Philadelphia, PA 19103  
(215) 841-6863

Dated: May 12, 1993