ORIGINAL

STATE OF CONNECTICUT

SITING COUNCIL

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CONNECTICUT LIGHT & POWER COMPANY AND UNITED ILLUMINATING COMPANY

APPLICATION FOR A CERTIFICATE OF ENVIRONMENTAL COMPATIBILITY AND PUBLIC NEED FOR THE CONSTRUCTION OF A NEW 345-kV ELECTRIC TRANSMISSION LINE AND ASSOCIATED FACILITIES BETWEEN THE SCOVILL ROCK SWITCHING STATION IN MIDDLETOWN AND THE NORWALK SUBSTATION IN NORWALK, CONNECTICUT

MAY 12, 2004
(10:50 A.M.)

DOCKET NO. 272

* *

BEFORE: PAMELA B. KATZ, CHAIRMAN

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A PARTY, THE TOWN OF EASTON

A PARTY, THE TOWN OF BETHANY

A PARTY, THE TOWN OF HAMDEN

AN INTERVENOR, THE TOWN OF FAIRFIELD

AN INTERVENOR, THE FIRST DISTRICT WATER COMPANY

AN INTERVENOR, NORWALK ASSOCIATION OF SILVERMINE HOMEOWNERS

A PARTY, ROBERT W. MEGNA, STATE REP. 97th DISTRICT

AN INTERVENOR, MARY G. FRITZ, STATE REP. 90th DISTRICT

AN INTERVENOR, AL ADINOLFI, STATE REP. 103rd DISTRICT

AN INTERVENOR, RAYMOND KALINOWSKI, STATE REP. 100th DISTRICT

AN INTERVENOR, THEMIS KLARIDES, STATE REP. 114th DISTRICT

AN INTERVENOR, JOHN E. STRIPP, STATE REP. 135th DISTRICT

AN INTERVENOR, WILLIAM ANISKOVICH, STATE REP. 12th SEN. DISTRICT

AN INTERVENOR, JOSEPH CRISCO, JR., STATE REP. 17th SEN. DISTRICT

AN INTERVENOR, LEONARD FASANO, STATE REP. 34th SEN. DISTRICT

. . .Verbatim proceedings of a hearing before the State of Connecticut Siting Council in the matter of an application by Connecticut Light & Power Company and United Illuminating Company, held at Central Connecticut State University Institute of Technology & Business, 185 Main Street, New Britain, Connecticut, on May 12, 2004 at 10:50 a.m., at which time the parties were represented as hereinbefore set forth . . .

CHAIRMAN PAMELA B. KATZ: We'll call this continuation of the Docket 272 hearing into order.

First, I'd like to state for the record that the Council has received into the record state agency comments from the Department of Public Health, dated March 15th, April 1st -- and Dr. Ginsberg, what's the latest?

DR. GARY GINSBERG: May 6th.

CHAIRMAN KATZ: May 6th. Also we have received State DOT comments dated April 27, 2004, and also DEP comments dated May 4, 2004.

In addition -- who's taking the lead? Mr.

Fitzgerald, can you just put into the record municipal consultation and agency comments?

MR. ANTHONY M. FITZGERALD: Yes, thank you. I'd ask the panel to turn to page 9 of the hearing program, and there are several additions to the group Exhibit 4, municipal consultation materials that are indicated in here in the shaded print. And will it be sufficient for the record to just refer to them that way --

CHAIRMAN KATZ: Yes --

MR. FITZGERALD: -- without reading the titles?

CHAIRMAN KATZ: If there's no objection, we will be taking into the record page 9 and 10 of the hearing program, additions to the municipal consultation record, plus state agency comments.

(Whereupon, additional materials were received into the record and attached to Applicant Exhibit No. 4 previously admitted.)

MR. FITZGERALD: Then we move to the CL&P exhibits. And we filed in response to the -- to someone's request -- I think it was Mr. Schaefer's request -- a letter that Dr. Cole had written to the Forum for Applied Research and Public Policy in the

spring of 1989, that's been designated Exhibit 52 for identification. Dr. Cole --

CHAIRMAN KATZ: First, just for the record, are all of your witnesses -- do we have any new witnesses?

MR. FITZGERALD: No.

CHAIRMAN KATZ: Okay. And I'd just like to remind all the witnesses they're still sworn. Go ahead.

MR. FITZGERALD: And Dr. Cole, do you swear that Exhibit 52 is a true copy of the letter that was published in the Forum for Applied Research and Public Policy under your name in the spring 1989 issue?

DR. PHILIP COLE: I do

MR. FITZGERALD: Now if we can move to page --

CHAIRMAN KATZ: Well is there any objection to making No. 52 a full exhibit? Hearing none, we will make 52 a full exhibit. Okay.

MR. FITZGERALD: Thank you for that. I'm sorry I skipped over that.

(Whereupon, Applicant Exhibit No. 52 was received into evidence as a full exhibit.)

MR. FITZGERALD: Now if we can move to

page 15 of the hearing program. And there is a list of companies' exhibits, again they're in shade, and they are numbered 71 through 81. Starting with Exhibit 71, which is an exhibit that consists of multiple interrogatory responses, and I would like to ask the witnesses to adopt individual responses for which they are listed as the responsible witness, or in the case of two -- or in this case one interrogatory for which Louise Mango who is not here is listed as a witness, Miss Bartosewicz will sponsor it. So with respect to Exhibit 71, I want to ask you, Miss Bartosewicz, to sponsor the answer to Question 39 and Question 49, Question 53. Mr. Zak, I'm going to ask you to speak with respect to Question 40, Question 46, Question 50, Question 52, and Question 57 for which you are listed as the responsible witness. And Mr. Prete, I'm going to ask you to speak to Question 55 for which you are listed as the responsible witness. Do you three --

CHAIRMAN KATZ: Also Dr. Bailey is listed in those exhibits.

MR. FITZGERALD: Coming up, but not in Exhibit 71.

CHAIRMAN KATZ: Oh, okay.

MR. FITZGERALD: Yeah.

CHAIRMAN KATZ: I'm sorry.

MR. FITZGERALD: Do you swear that the information presented in these interrogatory responses is true to the best of your knowledge and belief?

MR. ROGER ZAKLUKIEWICZ: Roger Zaklukiewicz. Yes, I do.

MS. ANNE BARTOSEWICZ: Anne Bartosewicz. Yes, I do.

MR. JOHN PRETE: John Prete. Yes, I do.

MR. FITZGERALD: And now moving on to Exhibit 72, the April 30th responses. Mr. Zak, you are listed as the responsible witness for all of those responses. Do you adopt them under oath as true and correct to the best of your knowledge?

MR. ZAKLUKIEWICZ: Yes, I do.

MR. FITZGERALD: Now moving on to Exhibit 73 --

CHAIRMAN KATZ: Do you want to -- any objection to making 71 a full exhibit? Hearing none, 71 is a full exhibit.

(Whereupon, Applicant Exhibit No. 71 was received into evidence as a full exhibit.)

MR. FITZGERALD: And I would offer 72 as a full exhibit as well. That's the one that Mr. Zak just -

-

CHAIRMAN KATZ: Any objection to making 72 a full exhibit? Hearing none, 72 is a full exhibit.

(Whereupon, Applicant Exhibit No. 72 was received into evidence as a full exhibit.)

MR. FITZGERALD: Okay, now we move on to 73, the Supplemental Testimony of Dr. Bailey concerning site specific designs to reduce 60-hertz electric and magnetic fields at the B'Nai Jacob, Ezra Academy, and the Jewish Community Center in Woodbridge.

CHAIRMAN KATZ: Can we lump 75 in with that too, Mr. Fitzgerald?

MR. FITZGERALD: No, because I've got a correction to this.

CHAIRMAN KATZ: Okay.

MR. FITZGERALD: Dr. Bailey, do you have a correction to this supplemental testimony?

DR. WILLIAM BAILEY: Yes, I do. One moment while I find the -- (indiscernible) --

COURT REPORTER: Dr. Bailey, you've got to go the microphone.

DR. BAILEY: One moment. (Pause).

MR. FITZGERALD: Do you have it?

DR. BAILEY: Yes. I have a correction to

page 15 of my supplemental testimony to Exhibit 12, and we have a replacement page. And the changes occur in Exhibit 12, Row 1, and the correction is to the right-of-edge at 0 feet, a new value, and also at the building edge a new magnetic field value. The correct values are 30.8 milligauss and 6.5 milligauss.

MR. FITZGERALD: And we are -- with that correction, Dr. Bailey, is the supplemental testimony marked as Exhibit 73 true and correct to the best of your knowledge and belief?

DR. BAILEY: Yes.

MR. FITZGERALD: And we're passing out the replacement pages. We'll also do a formal filing to catch up.

Exhibit 74 is the supplemental testimony of Robert Carberry and Kathleen Shanley concerning State policies with respect to 60-hertz electric and magnetic fields, dated May 3, 2004. Mr. Carberry and Miss Shanley, do you swear that that testimony is true and correct to the best of your knowledge and belief?

MS. KATHLEEN SHANLEY: Kate Shanley. Yes, I do.

MR. ROBERT CARBERRY: Bob Carberry. Yes.

MR. FITZGERALD: Dr. Bailey -- (mic

feedback) -- Exhibit 75 -- (mic feedback) -- the --

AUDIO TECHNICIAN: Can we go off the record for a minute?

CHAIRMAN KATZ: Yes, off the record.

(Off the record)

CHAIRMAN KATZ: On the record.

MR. FITZGERALD: Madam Chairman, I'd ask that Exhibits 73 and 74 for identification be accepted as full exhibits.

CHAIRMAN KATZ: Is there any objection to making 73 and 74 full exhibits? Hearing none, they're full exhibits.

(Whereupon, Applicant's Exhibit No. 73 and No. 74 were received into evidence as full exhibits.)

MR. FITZGERALD: Dr. Bailey, Exhibit 75 is other supplemental testimony of yours concerning the passive regulatory responses with respect to 60-hertz electric and magnetic fields. Do you adopt that under oath as your testimony and is it true and correct to the best of your knowledge and belief?

DR. BAILEY: I have two corrections, typographical errors --

MR. FITZGERALD: Oh, you do? I didn't realize that, I'm sorry. Would you please give them to

us.

DR. BAILEY: The first is on page 8, line 6, the line starts tent of environmental policy. At the beginning of the next sentence insert the word in.

On page 13, line 7, the line starts safety issues regarding fields from transmission lines but did not insert the word conclude that, and the word -- the last ending word instead of the should be they.

And in line 10, the line starts out transmission lines would be no higher, insert the word than those produced by existing.

And then in line 16, in the first line of the answer the line reads no period as shown in attachment 4, the most recent standards that we could find, insert -- we could, insert the word find.

And with those corrections I adopt this testimony.

MR. FITZGERALD: Will you provide errata sheets?

CHAIRMAN KATZ: Yes, he will.

DR. BAILEY: I do not have an errata sheet here --

MR. FITZGERALD: No, I mean we'll have to -- we'll have to follow up with that, so would you make a

note to do that.

MR. PHILIP T. ASHTON: Dr. Bailey, would you mind repeating the first correction that you made on page 8?

DR. BAILEY: Yes. It's in line 6. And at the beginning of the sentence that starts the REA declaration, it should read in the REA Declaration.

MR. ASHTON: Thank you.

CHAIRMAN KATZ: Is there -- are we ready to --

MR. FITZGERALD: Yes, I offer that as a -- well, with those correction is that testimony true and correct to the best of your knowledge and belief?

DR. BAILEY: Yes, it is.

CHAIRMAN KATZ: Is there any objection to making 75 a full exhibit? Hearing none, it's a full exhibit.

(Whereupon, Applicant Exhibit No. 75 was received into evidence as a full exhibit.)

MR. FITZGERALD: Now 76, those responses all have Anne Bartosewicz as the responsible witness. Maybe we can move -- and Exhibit 77 is -- John Prete is responsible. Exhibit 78, Roger Zak is responsible. Just let me stop right there. Do you three adopt those

responses as your testimony and are they true and correct to the best of your knowledge and belief?

MR. ZAKLUKIEWICZ: Yes, they are.

MS. BARTOSEWICZ: Yes, they are.

MR. PRETE: John Prete. 79, yes, they are.

MR. FITZGERALD: And -- well 77, John?

MR. PRETE: 77 as well.

MR. FITZGERALD: Okay. And I offer Exhibit 76 through 79 as full exhibits.

CHAIRMAN KATZ: Any objection to making 76, 77, 78, and 79 full exhibits? Hearing none, they're full exhibits.

(Whereupon, Applicant's Exhibits Nos. 76, 77, 78, and 79 were received into evidence as full exhibits.)

MR. FITZGERALD: And Exhibit 80 are responses addressed to the Town of Milford. Is there a correction to a portion of that exhibit?

DR. BAILEY: Yes, there is.

MR. FITZGERALD: Could you give that to us Dr. Bailey.

DR. BAILEY: A corrected sheet has been provided. There were typographical errors in the table

in the line identified as Oronoke Road, under measurements of fields from existing transmission lines and other sources at the edge of the right-of-way. The correct value -- the value was previously 0.026. The correct value is 0.064 for the electric field. For the magnetic field it was 1.2 milligauss and it should be 6.4 milligauss. And going directly below those two numbers down the column under Milford, the next line, the electric field had been 0.640, and that should be 0.026. The magnetic field in the next column was 6.4 and it should be 1.2. The typist apparently transposed these values in preparing the table.

MR. FITZGERALD: With those corrections are those responses -- I'm sorry -- is that exhibit, Exhibit 80, true and correct to the best of your knowledge and belief?

DR. BAILEY: Yes, it is.

MR. FITZGERALD: I offer it as a full exhibit.

CHAIRMAN KATZ: This is 80?

MR. FITZGERALD: Yes.

CHAIRMAN KATZ: Just 80 and not 81?

MR. FITZGERALD: Right. 81 is Miss Bartosewicz again, so --

CHAIRMAN KATZ: Okay. Any objection to making 80 a full exhibit? Hearing none, it's a full exhibit.

(Whereupon, Applicant Exhibit No. 80 was received into evidence as a full exhibit.)

CHAIRMAN KATZ: And Dr. Bailey, we'll expect an errata -- a written errata sheet on that also.

MR. FITZGERALD: We've just passed it out --

CHAIRMAN KATZ: Oh, fine --

MR. FITZGERALD: -- but we'll do -- but we'll do a formal filing as well.

CHAIRMAN KATZ: Yes, I'd appreciate that.

MR. FITZGERALD: And finally, Miss Bartosewicz, would you please adopt Exhibit 81 as your testimony and verify that it is true and correct to the best of your knowledge and belief?

MS. BARTOSEWICZ: Yes, I do.

MR. FITZGERALD: I offer it as a full exhibit.

CHAIRMAN KATZ: Is there any objection to making 81 a full exhibit? Hearing none, 81 is a full exhibit.

(Whereupon, Applicant Exhibit No. 81 was

received into evidence as a full exhibit.)

CHAIRMAN KATZ: At this point, Mr. Fitzgerald, you do want to make your request for administrative notice?

MR. FITZGERALD: Yes, please. I would ask that the Council take administrative notice of government documents as requested in -- the two requests for administrative notice that are listed at page 16 of the hearing program as Administrative Notice Items 15 and 16 of the companies.

CHAIRMAN KATZ: Hearing no objection, we'll take administrative notice of Items 16 and 17. Any procedural matters that we need to do?

MR. FITZGERALD: Yeah, 16 and 17, thank you.

CHAIRMAN KATZ: A step ahead of you. Okay, are there any procedural matters before we continue with cross-examination of your witness panel?

MR. FITZGERALD: I don't believe so.

CHAIRMAN KATZ: Okay. We're going to pick up where we left off, and that is with Attorney Schaefer representing Ezra Academy, B'Nai Jacob, etcetera. Mr. Schaefer. Where are we going to put Mr. Schaefer here?

MR. RORBERT L. MARCONI: He could sit to

the other side of Attorney Fitzgerald and use that microphone.

CHAIRMAN KATZ: Mr. Schaefer, we're going to put you up here and Mr. Fitzgerald is going to make you a spot -- let's make two spots.

COURT REPORTER: Off the record.

(Off the record)

MR. DAVID SCHAEFER: Thank you, Madam Chairman -- Chairwoman. I'd just like to make sure that my understanding is the same as that of the Council members. During the last hearing that I participated in the questioning made reference to a number of articles in an appendix. And we had delivered to the Siting Council a set of -- Appendix 1 and 2 with those articles in it for each Council member. And I -- I was told that rather than -- the staff didn't have them today, that they were given to each Council member. So, I just want to let the Council members know that our witnesses will be referring to that regularly tomorrow and it might be helpful if the members brought their copy of the appendices for reference at that time.

CHAIRMAN KATZ: Thank you for that heads up. And you're going to offer someone to carry it for us too, right.

MR. SCHAEFER: If I may proceed then?

CHAIRMAN KATZ: Yes, please proceed.

MR. SCHAEFER: Mr. Bailey, I'd like to address --

CHAIRMAN KATZ: It's --

MR. SCHAEFER: I'm sorry?

CHAIRMAN KATZ: It's Dr. Bailey.

MR. SCHAEFER: Dr. Bailey, sorry. Dr. Bailey, I'd like to address some questions to you to start out with. And I believe at the last hearing where you were on the panel, I had asked you just some brief preliminary questions concerning your role in preparing the application that is the subject of this hearing. Do you recall those questions?

DR. BAILEY: In general fashion, yes.

MR. SCHAEFER: Right, okay. And just to lay a foundation, it's my understanding that the portion of Volume 6 of the application that dealt with the EMF issue, that you were intimately involved in the preparation of that?

DR. BAILEY: That's correct.

MR. SCHAEFER: Okay. And you're associated with an organization called Exponent?

DR. BAILEY: That's correct.

MR. SCHAEFER: Okay. Are you part owner of that organization?

DR. BAILEY: I'm an employee.

MR. SCHAEFER: An employee, okay. And with respect to your work for the Applicants -- and I'm -- in the matter before the Siting Council, have you personally been retained or has your organization been retained?

DR. BAILEY: Our firm has been retained.

MR. SCHAEFER: Exponent, okay. And in fact, I think there's some reference to a resume by a Mr. Johnson from that firm as well that's done some work on this?

DR. BAILEY: That's correct.

MR. SCHAEFER: Alright. And could you just explain for the Council the scope of the work that you've performed on this application?

CHAIRMAN KATZ: Briefly.

DR. BAILEY: What we did was to take the data that the company provided us about the design of the facilities and loading the facilities and calculate the expected electric and magnetic fields associated with the 15-gigawatt and 27-gigawatt operating conditions. We performed a review of the relevant scientific literature

and put all of this information together in a summary report.

MR. SCHAEFER: Okay. So -- just so my understanding -- to make sure I have the correct understanding, is that the only work you did on the application? In other words, your role on this application was limited to analysis of the EMF issue?

DR. BAILEY: Largely, yes. I -- there's some other aspect, but I would say that almost exclusively it would be relating to EMF.

MR. SCHAEFER: Alright. And could you tell me how much Exponent has been compensated for the work you've done on this project to date?

MR. FITZGERALD: Excuse me. Did you --

CHAIRMAN KATZ: Can you get closer to a microphone, Mr. Fitzgerald.

MR. FITZGERALD: Did you mean for him to stop with the work done on the application or did you want him to talk about work done since the application was filed?

MR. SCHAEFER: I hadn't asked that question yet.

MR. FITZGERALD: No, but you asked about compensation that covered everything to date, so that

suggested to me that perhaps you meant to ask about work to date.

MR. SCHAEFER: I appreciate the heads up and I'll certainly go back and cover that. Sir, can you answer the question as to how much you've been -- you or Exponent have been compensated to date for the work done on this application?

DR. BAILEY: I -- I really don't have a firm number in mind of what we are compensated for for the preparing of the application. I would say that we're probably on the order of magnitude -- maybe, you know, $60,000.00 or something like that.

MR. SCHAEFER: Okay. And can you tell me how much you've been compensated for work since the preparation of the application on this -- the matter before the Siting Council?

DR. BAILEY: I -- including all kinds of meetings and hearings and things, we're talking in the order of two or three times that amount.

MR. SCHAEFER: Okay. Something in the range of $200,000.00?

DR. BAILEY: Or less. I -- I really -- I really can't be sure. I have not looked at those values.

MR. SCHAEFER: Alright. Well, what -- is

it measured on a contract basis or an hourly basis?

DR. BAILEY: On an hourly basis.

CHAIRMAN KATZ: You're wandering into the irrelevant here. I mean --

MR. SCHAEFER: I appreciate that, but I do want to build a record for the matters that I think are important for the Council to take into account the credibility of the witness and so I'd like this on the record.

CHAIRMAN KATZ: Okay, we're going to give you some leeway, but just let's -- as an administrative agency, we'd really rather spend the time on the technical, factual things.

MR. SCHAEFER: Well, I do appreciate that, but I think that in doing that, you have to judge the credibility of the witnesses before you and whether they have a bias and a financial stake in the outcome. And this person is not giving you technical information only, he's giving you his opinion on the health effects of EMF. And the fact that he has a financial stake in that opinion --

CHAIRMAN KATZ: You're -- now you're wandering into our brief. So why don't you just ask him a question.

MR. SCHAEFER: Sure. Well, I thought I had. Sir, can you tell me whether you're compensated on a contract basis or an hourly basis?

DR. BAILEY: On an hourly basis.

MR. SCHAEFER: And what are you paid per hour?

DR. BAILEY: My billing rate is currently $310.00 per hour.

MR. SCHAEFER: Thank you. Now, did you also do work on what's referred to as Phase 1, the earlier phase of this project?

DR. BAILEY: Yes, I did.

MR. SCHAEFER: Okay. And you were compensated for those services as well, is that correct?

MR. FITZGERALD: I'm going to object at this point. It's --

MR. COLIN C. TAIT: Mr. Schaefer, if you wanted us to know that he's been compensated for his testimony, I think we are aware of that.

MR. SCHAEFER: Okay. Well, fine. That -- that was all I was asking.

MR. TAIT: You could have done it a lot quicker than that. We're aware of --

MR. SCHAEFER: Well, okay --

MR. TAIT: Most expert witnesses are paid we understand --

MR. SCHAEFER: But none of ours are, so they will be a little difference, sir.

MR. TAIT: Yeah, but that in itself also raises a credibility question --

MR. SCHAEFER: Well, depending on the -- in the eye of the beholder, sir --

(Gavel)

MR. TAIT: I just want the record to reflect both sides of the issue --

MR. SCHAEFER: Right --

MR. TAIT: -- but thank you --

MR. SCHAEFER: -- well, I -- I do appreciate that.

CHAIRMAN KATZ: Let's proceed.

MR. SCHAEFER: Okay. Dr. Bailey, isn't it true that you've also done work on EMF issues on behalf of other utilities?

DR. BAILEY: That's correct.

MR. SCHAEFER: And you've been paid for that work, is that correct?

DR. BAILEY: Yes.

MR. SCHAEFER: Okay. Have you ever as an

expert witness testified in opposition to a proposal or application by an electric utility?

DR. BAILEY: I'm not customarily retained to testify for or against a particular project. I am retained by applicants to evaluate technical issues relating to the applications. And so I have for electric utilities done that kind of evaluation as I've done in this case.

MR. SCHAEFER: Okay. And my question is as a result of that work or otherwise have you ever publicly taken a position before any regulatory body or court of law that was adverse to an electric company or power utility?

DR. BAILEY: Again, sir, I am not -- my analyses stand by themselves. I do not take positions for or against projects. That technical material is relevant to the triers of fact in a particular case. And the occasions where I have provided expert testimony, it has been I've been retained by applicants for projects.

MR. SCHAEFER: Sir -- or Dr. Bailey, in this case you've performed certain measurements of projected EMF levels under certain circumstances, is that correct?

DR. BAILEY: We provided calculations of

electric and magnetic field levels and also measurements.

MR. SCHAEFER: Well, would you tell me the difference between a calculation and a measurement?

DR. BAILEY: Calculation -- the measurements are taken with a calibrated meter, going out and taking a spot or in some cases a short recording of the fields at a particular time in a particular location. Calculations of the fields from a facility, such as the proposed transmission line, involve taking the design of the line and its operating conditions, including the projected loading, and by using standard computational techniques computing what the calculated electric and magnetic field value would be at one or more locations.

MR. SCHAEFER: Okay. So is it fair to say that when you use the term calculation, that's a projection as opposed to an actual reading?

DR. BAILEY: As to a measurement, that's correct.

MR. SCHAEFER: Okay. So you use the term measurement for an actual reading and calculation to deal with a projection based on a mathematical model that you use?

DR. BAILEY: That's correct.

MR. SCHAEFER: Alright. And so -- I'm

going to tell you I'm focusing on calculations, sir, in the questions I'm now going to ask you. What model do you use to make those calculations?

DR. BAILEY: The calculations were made by Dr. Gary Johnson of our firm using a program developed by the Bonneville Power Administration. It's an agency of the Department of Energy.

MR. SCHAEFER: And in making the calculations using that model are you required to utilize or impute a number of assumptions to make the calculation?

DR. BAILEY: Yes.

MR. SCHAEFER: Alright. And I'm going to focus you on the calculations you made with respect to my clients. You're aware I represent Ezra Academy, B'Nai Jacob Synagogue, the Jewish Community Center and the Jewish Federation of Greater New Haven, you're aware of that?

DR. BAILEY: Yes.

MR. SCHAEFER: And you've actually been to their two facilities in Woodbridge, have you not?

DR. BAILEY: Yes.

MR. SCHAEFER: Alright. So with respect to the calculations you did of projected EMF readings at

those locations, how many assumptions did you have to put into the model to be able to arrive at those calculations?

DR. BAILEY: I don't offhand have a number of assumptions, but those assumptions would primarily focus on the distances at which the calculation points required. It would require input data as to the current on each of the conductors. It -- the model assumes, unless designated otherwise, that conductors are flat and parallel to the ground and that the ground is essentially flat. We also assumed for the calculation of electric fields that the nominal voltage of the line was increased by five percent.

MR. SCHAEFER: Any other assumptions you're aware of?

DR. BAILEY: Those are the basic assumptions.

MR. SCHAEFER: Alright. Now in terms of doing the current, that's not simply putting a number on the capacity of the line, is it?

DR. BAILEY: That number is -- that we used was derived from modeling conducted by the companies.

MR. SCHAEFER: Alright. Alright, now when

you say modeling by the companies is this a -- are you familiar with what model the company used?

DR. BAILEY: I am not familiar with the model that was used by the company to generate their load flow estimates.

MR. SCHAEFER: Alright. Now, can you give me an idea or do you know how sensitive the EMF calculations that are arrived at from your model are to changes in the numbers derived from the companies' model? Is that question clear or do you want me to restate it?

DR. BAILEY: I understand the question. The output of any model is dependent upon the input values and some values may be more important than others. And current flow is a very important parameter in terms of predicting the magnetic field at any particular point.

MR. SCHAEFER: Okay. Now, one number that I -- or terminology that I've seen used in your supplemental testimony is a -- I think it's 15-gigawatts and 27-gigawatts. Do I have that right?

DR. BAILEY: Correct.

MR. SCHAEFER: And do they represent a calculation of an average load throughout New England?

DR. BAILEY: They are modeled estimates of what the system load would be in New England at those

total loadings.

MR. SCHAEFER: Okay, well the -- let me make sure I understand that. Does the model used to get the 15-gigawatt number or is the 15-gigawatt number an assumption and the model then does calculations based on that assumption?

DR. BAILEY: The -- and perhaps Anne Bartosewicz or John Prete could jump in here about how they have used the modeling to arrive at these estimates.

MR. SCHAEFER: Well, that's alright, I'll get to that later, but I'm -- from your point of view what I'm just trying to understand is this 15-gigawatt number. Is that a calculation from the model or is that an assumption put into the model?

MR. FITZGERALD: What model?

MR. SCHAEFER: The -- well, I'll withdraw it. The -- you say that the readings done are based on a load level of 15-gigawatt, is that correct?

DR. BAILEY: Correct.

MR. SCHAEFER: Alright. Where did that 15-gigawatt number come from?

DR. BAILEY: That came from the load flow modeling performed by the company. That reflects the average loading -- system load in New England.

MR. SCHAEFER: Alright. So that is not a number that is specific to the locations that you're measuring at?

DR. BAILEY: That total number does not, but that obviously has site specific implications.

MR. SCHAEFER: Alright. And determining the site specific implications from this 15-gigawatt New England load level, is that done by the companies' model or your model?

DR. BAILEY: That's done by the companies' model.

MR. SCHAEFER: Alright. And my understanding is, and you tell me if I'm wrong, that there are very many factors that impact on the site specific impact of that 15-gigawatt New England wide load, is that correct?

DR. BAILEY: Yes.

MR. SCHAEFER: It has to do with what energy supply sources are hook up to the system, doesn't it?

DR. BAILEY: Yes.

MR. SCHAEFER: It has to do with what substations are drawing power from the system, isn't that correct?

DR. BAILEY: Yes.

MR. SCHAEFER: It has to do with the directions of the current at different locations?

DR. BAILEY: That's correct.

MR. SCHAEFER: Okay. What other factors impact on the local -- I'm going to use impact again -- but the effect that the local site you're measuring of this 15-gigawatt New England wide load?

DR. BAILEY: Anything that would affect the demand or supply of electricity in that area or possibly in other parts of New England.

MR. SCHAEFER: Now, let me turn -- the 15-gigawatt is represented to be an average load at the current time in the New England region, is that correct?

MR. FITZGERALD: Uh --

MR. SCHAEFER: I'm asking.

MR. FITZGERALD: Well, yes, but you're asking -- you're asking the witness who's already testified that he took assumptions based on that load to put them into his model. He's not the one --

CHAIRMAN KATZ: Mr. Schaefer, why don't you save that question for the people who indicated that they came up with that number and gave it to Dr. Bailey.

MR. SCHAEFER: With due respect, he relied

on it --

CHAIRMAN KATZ: Right --

MR. SCHAEFER: -- and I'm just laying a foundation for other questions, so I don't want to put it off until later. It's a simple answer and so I can go on and ask other related questions.

MR. FITZGERALD: Well, wait just -- if I might --

CHAIRMAN KATZ: Perhaps the witness -- instead of coming back to it later, perhaps we can have another witness answer it now.

MR. FITZGERALD: Under the procedure here, you're not limited --

CHAIRMAN KATZ: You're not limited to Dr. Bailey, you have the whole panel.

MR. FITZGERALD: -- not just Dr. Bailey.

MR. SCHAEFER: Dr. Bailey, can you answer the question?

DR. BAILEY: Can you read back the question again please --

MR. SCHAEFER: Well, I'll try to --

DR. BAILEY: -- or rephrase it?

MR. SCHAEFER: Sure. The -- the 15-gigawatt my understanding is an average load in the New

England region, is that correct?

DR. BAILEY: Yes.

MR. SCHAEFER: Okay. And that's as of today, a current average?

DR. BAILEY: Subject to check with Roger, it's going out -- what would be expected in the future when this project is built.

MR. SCHAEFER: Okay.

DR. BAILEY: And I think one of the witnesses here can confirm that.

MR. ZAKLUKIEWICZ: I think in our response to Town's 02 Question, Town's 35, we indicated that the 15 gigawatts in 2002 occurred 4,187 hours of the year, which is approximately 48 percent of the hours in a year that the load was in excess of 15 gigawatts throughout New England.

CHAIRMAN KATZ: What was the percentage again, Mr. Zak?

MR. ZAKLUKIEWICZ: Forty-eight percent.

CHAIRMAN KATZ: Thank you.

MR. SCHAEFER: Now, you also did calculations at 27 gigawatts, is that correct?

DR. BAILEY: That's correct.

MR. SCHAEFER: Okay. And what did you

understand the 27-gigawatt level to be?

DR. BAILEY: That was the system-wide peak loading that might occur for, you know, the highest load condition during an hour during the summer, so it may be something that might occur for a few hours a year.

MR. SCHAEFER: Alright. And again, I'll defer to whoever's got the expertise on the panel, but is this as of today or as of sometime in the future?

MR. ZAKLUKIEWICZ: The ISO New England CELT report indicates that we could approach a peak load hour of 27,700 megawatts -- or 27.7 gigawatts anytime between 2005 and 2010.

MR. SCHAEFER: Okay.

CHAIRMAN KATZ: So Mr. Zak, would you say it's reasonable that this Council uses the 27-gigawatt case when we're looking at how many milligausses the proposed line will have?

MR. ZAKLUKIEWICZ: That is correct.

CHAIRMAN KATZ: Thank you.

MR. SCHAEFER: And the -- again, I'll let anybody answer the question -- do we have any projection from the companies or from ISO New England as to what a comparable level will be 10 years later?

MR. ASHTON: Comparable level to what?

MR. SCHAEFER: To the 27 gigawatts. So they --

MR. ASHTON: Peak load?

MR. SCHAEFER: Peak load, which was -- I believe he said anywhere from 2005 to -- I don't want to restate his testimony because I missed it -- it was 7 or 10 -- to 10.

MR. ZAKLUKIEWICZ: I believe, subject to check, the CELT report -- this is a ISO New England generated document -- has indicated that the New England load would be growing by approximately 1.2 to 2 percent per year, compounded annually. That would be the peak load.

CHAIRMAN KATZ: So the load -- if you could do the math for us -- so in 2020, what are we talking about in the way of gigawatts?

A VOICE: We'll have to recalculate that --

CHAIRMAN KATZ: Okay, we'll come back to that then --

MR. PRETE: We'll calculate that right now --

MR. SCHAEFER: Yeah, and while you're doing that, I'll give you another -- if you can help me,

what is the life expectancy of these lines that you're proposing to install?

MR. ASHTON: Is that for accounting purposes or is that --

MR. SCHAEFER: No, operational --

MR. ASHTON: -- for operational purposes --

MR. SCHAEFER: Operational purposes.

MR. ZAKLUKIEWICZ: We previously testified that this project was good for 30 years.

MR. SCHAEFER: Okay. Could I -- the -- there are 115, is it kilovolt, lines that are currently in operation?

MR. ZAKLUKIEWICZ: Correct.

MR. SCHAEFER: How long have they been in operation?

MR. ZAKLUKIEWICZ: Somewheres between the 1940's and 1950's.

MR. SCHAEFER: Alright. And -- but it's accurate to say that with modern technology that we're installing now, some 60 years later the expectation is that these lines will only last half as long as the 115 lines have lasted?

MR. ZAKLUKIEWICZ: My comment was -- you

asked how long the lines were there, the lines have been there -- I would have to -- subject to check -- how many times since they were originally installed have they been rebuilt, replaced, modified, I do not know that off the top of my head.

MR. SCHAEFER: Okay. Well --

COURT REPORTER: One moment please. (Pause). Thank you.

MR. SCHAEFER: Again, if it's -- I don't know if it's proper for me to ask them or ask the Council to ask them, but I think it would be useful to have a calculation of that peak load in 30 years and in 40 and 50 years, just so we have that number to consider.

CHAIRMAN KATZ: So can you have your calculation person do 2020, 2030, 2040, 'til -- Mr. Fitzgerald?

MR. FITZGERALD: Well, there's a request for a calculation of a peak load. I don't know how -- if you're asking them to do arithmetic, that's one thing. But if you're asking them to subscribe to the proposition that the answer is representative of the peak load, I don't think that they can do that. There's been testimony that ISO has estimated a certain growth rate. I don't know that that has been estimated to be the

growth rate for infinity. It's for some --

CHAIRMAN KATZ: Why don't we --

MR. FITZGERALD: -- it's for some period of time --

CHAIRMAN KATZ: Right. Why don't we --

MR. FITZGERALD: -- and a calculation can be based on that, whatever it is, but --

CHAIRMAN KATZ: Understood. We'll understand that we're taking this ISO assumption and we're taking it out -- and we're taking it only as the ISO assumption to 2020, 2030 and 2040.

MR. SCHAEFER: And we understand it could be much more than that or much less than that --

MR. FITZGERALD: And --

MR. SCHAEFER: -- we just don't know.

CHAIRMAN KATZ: With those caveats.

MR. SCHAEFER: Right.

MR. ZAKLUKIEWICZ: Well, my understanding --

CHAIRMAN KATZ: Did ISO put a limit on that compounding rate to -- only to a certain year?

MR. ZAKLUKIEWICZ: The CELT report has a limited timeframe. And all I can do is obtain a copy of the CELT report and indicate from the CELT report what

their projections are for that timeframe that they've identified --

CHAIRMAN KATZ: Why don't you --

MR. ZAKLUKIEWICZ: -- certainly going beyond that is going to account for what are the economic conditions and what are the other changes that are going to occur throughout all of New England, which would have a dramatic impact on what is the projected electricity usage both in normal times and in peak hours throughout New England.

CHAIRMAN KATZ: Why don't we take that as a homework assignment and if you could report on that tomorrow on what the limitations and assumptions are in that ISO information, and we'll go from there tomorrow. Okay, Mr. Schaefer?

MR. SCHAEFER: Thank you very much. Dr. Bailey or anybody else that wants to answer it, the proposed lines, the 345-kilovolt lines that are going to -- that are proposed to be installed near the organizations that I represent that you're familiar with, isn't it true that the size of those electrical lines were chosen larger than was necessary to pass through the current that's being projected at the current time?

DR. BAILEY: It's my understanding that's

correct.

MR. SCHAEFER: Okay. And one of the reasons for doing that is because it can assist in reducing noise, isn't that correct?

DR. BAILEY: That's correct.

MR. SCHAEFER: Alright. But that also permits increased flows through those lines in the future more than are projected at the current time, isn't that correct?

DR. BAILEY: If -- if other conditions were possible, but other conditions may be limiting factors in terms of connections or substation equipment and so on.

MR. SCHAEFER: Exactly. And so it might depend on what those other conditions are now and how they changed over time?

DR. BAILEY: It could.

MR. SCHAEFER: Okay. Now, you testified previously that your calculations done in the model that you use are sensitive to changes in the current flow assumption, is that correct?

DR. BAILEY: They depend upon the current flow assumptions.

MR. SCHAEFER: Alright. And so therefore

-- let me ask if the current flow assumption changes by 10 percent, can you tell me what impact that has on the calculations that come out of your model?

DR. BAILEY: It would depend upon what combination of conductors you have. In the simplest case there could be a 10 percent change. In other cases in either direction --

MR. SCHAEFER: Okay --

DR. BAILEY: -- and in other cases that might not be correct.

MR. SCHAEFER: Okay. Now when you reported to the Council the results of your modeling, you give a specific EMF calculation for a particular location and scenario, is that correct?

DR. BAILEY: That's correct.

MR. SCHAEFER: Okay. And based on your model, what's your level of certainty that that calculation will be the actual EMF reading when this system is built according to the assumptions you used in your model?

DR. BAILEY: Assuming that the existing lines and the proposed line were correctly described in our model in terms of the spacing of the conductors, under those -- and for those loading conditions, we would

expect there to be a very close correspondence to those predicted values --

MR. SCHAEFER: Okay --

DR. BAILEY: -- as you're aware however, the -- in the application we provided calculations based upon whole sections, whole segments of the line. And at particular locations in that section there may be differences in current flow, there may be differences in conductor height, the type of structure there, that at a particular location may result from differences from those calculated values.

MR. SCHAEFER: Alright. So that I understand, you did -- in the application itself you did some typical readings that don't necessarily give an accurate reading that you can apply all the way along the line?

MR. FITZGERALD: Well, I'll object to that question. The term readings is -- mischaracterizes the prior testimony --

MR. SCHAEFER: I'll accept the helpful hint and change it to calculation.

DR. BAILEY: Okay. Yes, the calculations in the application are for generic cross-sections or typical cross-sections and may not be strictly applicable

at every part along that segment.

MR. SCHAEFER: Okay. But in your supplemental testimony, especially that applicable to my clients, you attempted to do calculations that were specific to a particular location, is that correct?

DR. BAILEY: That's correct.

MR. SCHAEFER: Alright. Now in doing this kind of modeling, can you do a statistical calculation of the likelihood under your model that in real life you'll get the same number as you're projecting?

DR. BAILEY: We do not have the data to do that calculation.

MR. SCHAEFER: And is that sometime in your field called an error rate?

DR. BAILEY: Not -- not with regard to this application.

MR. SCHAEFER: Alright, okay. How about the term confidence interval?

DR. BAILEY: Not in this engineering application.

MR. SCHAEFER: Okay. Now, what -- if I asked you whether or not the model has been verified, does that terminology have meaning in your field?

DR. BAILEY: Which specific model are you

referring to?

MR. SCHAEFER: I'm talking about the model that you used to calculate EMF readings?

DR. BAILEY: That model has been used by a variety of agencies over many years. And I know of a number of locations in which the correspondence between calculations and measurements at the same locations have been done and shown a very close agreement.

MR. SCHAEFER: Okay. And that's what you mean by verification, that you do a model of what the EMF reading is going to be in advance of construction, and then after construction you go out and take a reading and see if it matches your projection, is that correct?

DR. BAILEY: For that same load flow condition.

MR. SCHAEFER: Correct, alright. Now, you have made a proposal -- no, I don't want to characterize that -- you have done a calculation with respect to a split phase arrangement of power lines in your supplemental testimony, is that correct?

DR. BAILEY: Yes.

MR. SCHAEFER: Alright. And are you aware of anywhere in Connecticut where that split phase form of construction has been used?

MR. FITZGERALD: I think that would be better addressed to one of the people who would know. Whether he's aware of it or not, I don't think gives you the answer.

CHAIRMAN KATZ: Is there another witness who can answer that?

MR. ZAKLUKIEWICZ: The answer is, no, I am not aware of anyplace else in Connecticut where we have used split phase.

MR. SCHAEFER: Okay.

CHAIRMAN KATZ: How about New England?

MR. ZAKLUKIEWICZ: To my knowledge, no place else in New England either.

MR. SCHAEFER: Could we try the United States?

CHAIRMAN KATZ: Sure.

MR. ZAKLUKIEWICZ: Not -- not that I am aware of.

MR. SCHAEFER: The world?

DR. BAILEY: I -- could I consult with a colleague one moment?

MR. SCHAEFER: Sure.

CHAIRMAN KATZ: Off the record.

(Off the record)

DR. BAILEY: It's our understanding that a utility on the West Coast has tested a split phase configuration of a transmission line. And there have been -- a test line in Sweden has been on an experimental basis evaluated.

MR. SCHAEFER: Okay.

CHAIRMAN KATZ: Is it a fair statement --

DR. BAILEY: A similar -- a similar --

CHAIRMAN KATZ: -- that this technology is experimental, the split phase?

DR. BAILEY: The -- my understanding is that these -- there may be variations in what type of -- how the design is implemented, but the essential concept has been tested. And that concept is that you take a single circuit and you divide it such that equal amounts of current flow on the conductors in parallel and that the phasings of those conductors are adjusted to maximize mutual cancellation of the fields.

CHAIRMAN KATZ: Can the Applicant's panel just indicate how confident they are in the numbers based on the milligauss numbers based on the split phase?

MR. PRETE: John Prete from UI. As Dr. Bailey has stated, in the application that we have talked to JCC and Ezra Academy, this line as we know is

continuous from Milford up to Cheshire. And if you can envision this 22-mile line, within the 22-mile line as Dr. Bailey has testified you split it 50/50 in the diagrams that we have given into testimony. We are extremely confident that that current flow will split at those areas. If you envision a hose feeding as an analogy the water and the water splits in equal hoses, then you know are in parallel, the same amount of water will flow on those. So then the question is asked, okay, now that we know that the current is equal and we have a high degree of confidence, the question then is how much confidence do we have in the model projecting this very very precise current flow. And I'll yield that question to Dr. Bailey, I'm not sure I'm suppose to ask questions, but I wouldn't do it anyway.

CHAIRMAN KATZ: Mr. Emerick -- before you answer -- Mr. Emerick.

MR. BRIAN EMERICK: Dr. Bailey, on the split phasing --

MR. ASHTON: Hold it a second. Go ahead and try it now.

MR. EMERICK: On the split phasing, I kind of always -- well, let me back up -- I always assumed that the current split anyway if there's -- whatever the

number of conductors are, there was an equal amount of current in those conductors today, which I assume would be reflective in the model that you're already doing?

DR. BAILEY: In implementing the split phase design, if you assume a certain number of amps in each of the three phase conductors, when you now put up an extra three conductors on the other side of the tower as we have described in one example, the currents would be one-half in each one of the conductors, so that the total current flow is divided amount six conductors and not three conductors.

MR. EMERICK: Okay.

CHAIRMAN KATZ: Mr. Ashton.

MR. ASHTON: Yeah. In that -- in that configuration do you maintain the same phasing from top to bottom of the structure on both sides or do you roll the phasing, or what?

DR. BAILEY: The phasing is rolled to obtain the maximum mutual cancellation.

MR. ASHTON: Okay, now that's a term of art. Would you care to explain what rolling means?

DR. BAILEY: The standard designation for the three phase wires is let's say A,B,C or 1,2,3, and those phases may be carried in a constant position on the

tower from tower to tower throughout a section, or for a variety of reasons you may change the location of those phases so that what was formally the A phase now becomes in the position of the C phase. In the split phase design what is done is that the phasing of the conductors on each side are adjusted so that the field achieves a mutual cancellation.

MR. ASHTON: Okay. Now let me, if I can -- and I think I want to ask this of Mr. Zak since he is probably familiar with the bulk of the transmission in Connecticut -- are there instances where between two substations there are two circuits in parallel, Mr. Zak, at whatever voltage? Between Southington and Berlin for example?

MR. ZAKLUKIEWICZ: That is correct.

MR. ASHTON: And has the -- have the utilities in Connecticut done this rolling of phases on such circuits for whatever reason?

MR. ZAKLUKIEWICZ: Yes, we have.

MR. ASHTON: So isn't that directly comparable to the kind of change that you are proposing in this split phasing?

MR. ZAKLUKIEWICZ: It is basically identical, except here we're doing it on a single

structure.

MR. ASHTON: Okay. So the technology is not radically new at all in that regard, is that --

MR. ZAKLUKIEWICZ: No, it is not.

MR. ASHTON: Thank you.

CHAIRMAN KATZ: Thank you. Back to you, Mr. Schaefer.

MR. SCHAEFER: Okay. Dr. Bailey, are you aware of any instances where -- let me withdraw that -- it sounds like that one of the imputes in your model is the current flow, is that correct?

DR. BAILEY: Correct.

MR. SCHAEFER: Okay. And then another thing that one has to take into account in your model is the cancellation effect, is that correct?

DR. BAILEY: I'll interpret that as meaning the specification of the phases and their locations and space.

MR. SCHAEFER: And therefore, what impact that has on cancellation of EMF fields?

MR. FITZGERALD: Objection. I don't -- it's a hanging phrase and --

CHAIRMAN KATZ: Perhaps you can rephrase it, Mr. Schaefer --

MR. FITZGERALD: -- I don't know what he means.

MR. SCHAEFER: I certainly will try. Sir, part of the -- what your model is suppose to be doing is calculating the effect that this cancellation of split phase lines has on the size of the EMF field?

DR. BAILEY: Correct.

MR. SCHAEFER: Alright. And to your knowledge has the model you're using been verified in the field to show whether or not -- well, let me -- has it been verified in the field with respect to a split phasing proposal of the kind you're making here?

DR. BAILEY: The model has been verified on a variety of different transmission designs at different voltages, both single circuit lines and double circuit lines, and there is no reason why, as Mr. Ashton indicated, the calculations of the fields from the split phase design should be in any way different in nature than what we had done for the original delta design or the vertical designs that we have discussed with you, or any other configuration.

MR. SCHAEFER: Okay.

CHAIRMAN KATZ: Dr. Bailey, for example, you indicate on replacement page 15, Exhibit 12, that

with split phase, JCC, milligauss at building edge would go from 14.5 to 3.0 --

DR. BAILEY: Excuse me, could you give me the --

CHAIRMAN KATZ: Replacement page 15 --

DR. BAILEY: Right.

CHAIRMAN KATZ: -- Exhibit 12 --

DR. BAILEY: Um-hmm.

CHAIRMAN KATZ: -- JCC, 27-gigawatt case --

DR. BAILEY: Right.

CHAIRMAN KATZ: -- you indicate that on the proposed line, building edge, the milligauss would go from 14.5 to 3.0 under split phasing, correct?

DR. BAILEY: The -- let me -- the 14.5 is a calculated value for -- if we had -- if the 345-kV line was built as a single vertical structure. If you -- if you go back to row 1, it's -- at the building edge it's the calculated field at that building edge for the existing 115-kV lines, and the second row is for the existing lines plus the addition of the proposed line. And then going lines 3 through 6, look at different variations in the design that we evaluated. In line 3 it's -- if you look over in the right-hand side, look at

the conductor height --

CHAIRMAN KATZ: Right, depending on the height of the structure.

DR. BAILEY: Yeah.

CHAIRMAN KATZ: So just --

DR. BAILEY: It increases the height of the structure --

CHAIRMAN KATZ: Right--

DR. BAILEY: -- in 3 by another 10 feet, and 4 and 5 what happens if we put it in a vertical configuration. And the last one is what if it's configured in the split phase design.

CHAIRMAN KATZ: So, I'm -- I guess getting to accuracy and precision, if you get -- if you can get the 3.0, is that plus or minus a certain number?

DR. BAILEY: That -- that number for the load flows that we put into the model, that would be a quite accurate number for all the specifications. Now, obviously load flows change -- or can change from minute-to-minute, hour-to-hour, day-to-day, week-to-week, seasonal, and so on. And so those numbers, those calculated values could be lower or higher than that estimated value.

CHAIRMAN KATZ: Can you give us a range?

DR. BAILEY: I cannot give you a range of what that is. Perhaps someone in the company who is more familiar with the variations --

CHAIRMAN KATZ: Well, just --

DR. BAILEY: -- in the loading here could provide that estimate.

CHAIRMAN KATZ: Getting back to -- just getting back to my engineering math course, when you say 3.0, to me that's different than you're saying 3 for a number. I mean you're indicating a level of precision there. And I'm just asking you if that -- if you're comfortable with the level of precision that you're indicating down to tenths of a milligauss?

DR. BAILEY: It's not unreasonable given those input assumptions. But if you're going to say well, you know, if we take this value for that loading and, you know, an hour later that loading is changed by five percent, would I expect this still to be 3, it may not be. And so the principle uncertainty I would prefer to use, has to do with the nature of the distribution of loading on a particular line and the whole system. And I don't have any way of quantifying that. What we've done is to look at boundary conditions, here is the average system-wide loading and we've also provided what those

would be for an extreme 27-gigawatt case.

CHAIRMAN KATZ: Mr. Emerick, did you have a question?

MR. EMERICK: No, other than to say that in terms of this base case, 27-gigawatt case, the 3.0 in your opinion is a good number, and obviously that changes as load changes or as current changes?

DR. BAILEY: Right.

CHAIRMAN KATZ: Mr. Schaefer, why don't we do this, we're coming up on noon, why don't you ask what questions you have on this particular subject of split phasing, if you have any more, and then we'll do our lunch break.

MR. SCHAEFER: I have quite a few more on that because that's the substance of his supplemental testimony --

CHAIRMAN KATZ: Okay --

MR. SCHAEFER: -- that applies to my clients --

CHAIRMAN KATZ: -- so you do have -- okay. Why don't we do this then, we'll take our lunch break. We are going to resume promptly at 1:00 o'clock. At 1:00 o'clock we will have Council witness Dr. Ginsberg on, he will verify his testimony and be available for cross.

We'll do procedural motions. And then we'll resume Mr. Schaefer's cross after that. So --

MR. ASHTON: Madam Chairman --

CHAIRMAN KATZ: Mr. Ashton.

MR. ASHTON: I'd like to apologize to the parties to this case for my late appearance. I had a call to give blood this morning and it's a long procedure up in Farmington, and I thought it would be two hours and it turned out to be closer to two and a half, so my -- my apologies to everybody for the delay.

CHAIRMAN KATZ: So we will resume promptly at 1:00 o'clock.

(Whereupon, a luncheon recess was taken.)

CHAIRMAN KATZ: I'd like to resume at this time. At this point we are interrupting the cross-examination and we are going to take Council witness Dr. Gary Ginsberg.

Dr. Ginsberg, I'm going to have you verify your exhibit. And I just want to for the record -- for the record, I just want to outline that -- what we're going to suggest is that your two-page cover letter be your exhibit per say that you will verify. And then we're going to ask that we take administrative notice of the various government documents that you've attached to

your testimony. And -- in fact, you don't have a sheet that summarizes all your attachments, do you?

DR. GINSBERG: I --

COURT REPORTER: A microphone please, doctor.

DR. GINSBERG: I intended that the cover letter would summarize what the attachments contain.

CHAIRMAN KATZ: Some of them are mentioned in the cover letter and I think some of them aren't.

DR. GINSBERG: There are three Wartenberg META analysis, epidemiology studies that are not part of the cover letter, but I added to what was copied for the record because they may come in part of today's proceedings --

CHAIRMAN KATZ: Okay --

DR. GINSBERG: -- so I just thought they should be available.

CHAIRMAN KATZ: Okay, at this time -- you were sworn previously, correct?

DR. GINSBERG: That's correct.

CHAIRMAN KATZ: Okay. Mr. Marconi, let's -- let's verify his exhibit.

MR. MARCONI: Okay. Dr. Ginsberg, the letter of May 6, 2004 that we have been given a copy of

today, is that in fact a letter that was prepared by you?

DR. GINSBERG: It is.

MR. MARCONI: Okay. And is that letter in fact true and correct to the best of your knowledge and belief?

DR. GINSBERG: Yes, it is.

MR. MARCONI: And do you have any changes or corrections that you need to make to this?

DR. GINSBERG: None.

MR. MARCONI: And do you adopt this as your testimony today? In other words, you're swearing to the truth of it?

DR. GINSBERG: I'm swearing to the truth of what is submitted in this, yeah.

MR. MARCONI: Right.

DR. GINSBERG: Right.

MR. MARCONI: Okay. Madam Chair.

CHAIRMAN KATZ: Any objection to making this a full exhibit? Hearing none, we'll make this a full exhibit.

(Whereupon, Council Exhibit No. 1 was received into evidence as a full exhibit.)

MR. MARCONI: And let me specify, Madam Chair, is this basically the two-page letter?

CHAIRMAN KATZ: Yes.

MR. MARCONI: And we're dealing with the attachment separately?

CHAIRMAN KATZ: Yes. Is there any objection -- what -- I'm going to take what's actually attached -- I'm going to do it in two separate motions, what's actually attached to Dr. Ginsberg's thing and then I will take the Wartenberg thing separately, okay. Is there any objection to the Council taking administrative notice to the attachments -- the direct attachments to Dr. Ginsberg's May 6, 2004 testimony?

MR. MARCONI: Those directly stapled to I believe, correct?

CHAIRMAN KATZ: Directly stapled to it. Mr. Schaefer, if you want to be heard, if you could come to the mic.

MR. SCHAEFER: I'm just trying to understand the Council's procedures. I have no objection to your noticing them. They're not government publications. So if that doesn't meet your standard, I just want us to try to be consistent.

CHAIRMAN KATZ: Okay --

MR. SCHAEFER: So -- there are letters, there are --

MR. MARCONI: The letter of March 8th is a local government document, a letter from the First Selectman.

MR. SCHAEFER: I don't think that's an official government publication --

CHAIRMAN KATZ: Correct --

MR. SCHAEFER: -- it's a communication.

MR. MARCONI: It's not a -- it's a government document though, not a publication, correct.

MR. SCHAEFER: Okay.

CHAIRMAN KATZ: Yes, it's a government document.

MR. SCHAEFER: And there's an e-mail from me. Am I part of the government now? I mean, I don't know what the standard is? I'm just pointing out that it does not appear to be limited to government publications.

MR. FITZGERALD: I think Mr. Schaefer is right there. I think the Chair and I was thinking -- have the website in mind as the government documents to be noticed. But then there is, as Mr. Schaefer points out, after you get through the website printouts from the government agency websites, there is an e-mail from Mr. Schaefer with some enclosures, which in the testimony Dr. Ginsberg explains why he's attaching this, because there

was a request for communications. So maybe -- even though -- even though the website materials would be independently administratively noticeable since they're government publications, since they're not listed here, I would -- may I suggest that this packet, which includes his two-page letter and explains that he's attaching website materials and explains that he's attaching other things that he's been asked for, that the whole package just be accepted as his testimony.

CHAIRMAN KATZ: Okay. Is there any objection to making the whole packet a full exhibit? Hearing none, we'll make it a full exhibit.

(Whereupon, attachments were added to Council Exhibit No. 1.)

CHAIRMAN KATZ: Now on the Wartenberg articles, I'll take suggestions on how you people would like to handle those.

MR. TAIT: I'd like to know dates and references.

CHAIRMAN KATZ: Yeah, these are undated Dr. Ginsberg. Do you -- it says 2001 Wiley list. Is that the date of authorship?

DR. GINSBERG: The -- there are two studies from 2001 from the Journal Bio --

MR. TAIT: That's what I wanted, the Journal of --

DR. GINSBERG: Bio-electronics --

MR. ASHTON: Why don't you identify what each one is so that we can document it.

DR. GINSBERG: Okay, the earliest study that -- putting forward for the record is by Wartenberg, et al, from Environmental Health Perspectives, 1993.

MR. ASHTON: Wait a minute --

MR. TAIT: Is that one entitled Identification --

DR. GINSBERG: Yes.

MR. TAIT: And the citation of that is what?

DR. GINSBERG: Environmental Health Perspectives, Volume 101 --

MR. TAIT: Volume 101, Environmental Health Perspectives --

DR. GINSBERG: Right. Page 626.

MR. TAIT: Page 626. The date?

DR. GINSBERG: 19 -- December 1993.

MR. TAIT: 12/93.

DR. GINSBERG: Then the second one would be the Wartenberg publication in Bio Electromagnetics,

Supplement 5.

MR. TAIT: Entitled the Potential Impact of Bias?

DR. GINSBERG: That's correct.

MR. TAIT: And so that's in Bio Electromagnetics. What volume, what page?

DR. GINSBERG: Supplement 5, pages S32 to S47. And that's a 2001 publication.

MR. TAIT: And it's called the Journal of Bio --

DR. GINSBERG: No, it's just Bio Electromagnetics. It's not journal of.

MR. TAIT: That's the full -- there's no -- and is that Volume 5 -- Supplement 5?

DR. GINSBERG: Right.

MR. TAIT: I'm looking at the top, it says Supplement 5 to -- what's it supplemental to?

DR. GINSBERG: No, it's -- it's Volume 5 -- it's -- it's -- it must be the supplement to Volume 5. So that's the way I would -- it's -- well -- actually, that's -- that's not a hundred percent clear whether it's the --

MR. TAIT: Yeah. I want to know where I could find it if I didn't have it in front of me.

DR. GINSBERG: Right, right.

MR. TAIT: Perhaps you could at some point get us the right citation, so if it is a supplement to something else -- if there's a supplement 4, 3, 2 and 1, I don't know.

DR. GINSBERG: I'll go on the journals website --

MR. TAIT: Thank you --

DR. GINSBERG: -- and see if I can better --

CHAIRMAN KATZ: Thank you. Mr. Marconi.

MR. MARCONI: Dr. Ginsberg, can you please tell me how you came about these publications? How you --

MR. TAIT: There's a third one --

MR. MARCONI: Oh, excuse me.

MR. TAIT: Let's finish that off.

MR. MARCONI: Yes.

MR. TAIT: This is the Supplement 5 but later pages?

DR. GINSBERG: Right.

MR. TAIT: Okay, alright.

DR. GINSBERG: Exactly. The -- responding to Mr. Marconi's question, sitting at the hearing in

March, the reference was made in one of the documents that had been brought up to a Wartenberg study and we did not have it at the Health Department. So, I did a literature search under that name on the internet and came up with these three relevant articles, which I found to be informative. Two of them are very recent, more recent than the two META analyses that we had been using as our primary references on EMF and possible health effects. So these two I thought I'd bring forward. And then the third one gets at some -- more of the issues of selection bias as a possibility. Again, it has some basic data, the 1993 study.

MR. TAIT: Do these in any way change your testimony priorly?

DR. GINSBERG: They do not?

CHAIRMAN KATZ: I'll take suggestions on how you would like to put these Wartenberg articles into the record.

MR. FITZGERALD: I'd like to ask a couple of questions --

CHAIRMAN KATZ: You wish to inquire as they say --

MR. FITZGERALD: -- in aid of a possible objection. Doctor, I take it that you are not putting

these articles forward as representing work that you've done or opinions that you have formed and published yourself?

DR. GINSBERG: That's correct.

MR. FITZGERALD: And in -- and you have not referred to them in the prefiled testimony, your opening statement, or the supplemental comments that have just been admitted as testimony?

DR. GINSBERG: I did not use these in those prior submittals.

MR. FITZGERALD: Okay. And you said that you looked these up because you thought they might come up?

DR. GINSBERG: No, that's not correct. I looked these up because I had seen reference to Wartenberg META analyses from the previous hearing and I wanted to track that down, not because I thought it would come up necessarily today. I was looking to see whether it might be useful to further understand the issues that we were asked to grapple with.

MR. FITZGERALD: And do -- and you don't maintain that these -- so you made a search under a name Wartenberg and this is what you came up with?

DR. GINSBERG: Right.

MR. FITZGERALD: Alright. And you don't represent that these three articles are in any way representative of the universe of individual articles that are out there, right?

DR. GINSBERG: No -- if I could be allowed to answer that question fully, these are the most recent META analysis of the subject matter that we were able to find, so that we felt that -- and also that one of the articles presents a summary of previous META analyses, so it's sort of a composite summary with some new analysis that we felt would be sort of icing on the cake in this area until somebody else publishes something more current.

MR. FITZGERALD: Well, you don't actually know, do you, that somebody else hasn't published something more recent than this? You didn't do that kind of a search, did you?

DR. GINSBERG: We did not.

MR. FITZGERALD: Okay. And one of these articles was published in '93, one is a review of META analyses, and one is about -- is an article about bias, right? Those are the three that I have.

DR. GINSBERG: To be specific, one is a publication in '93 that looks at the relationship between

demographics, for example socioeconomic status and living near power line or EMF sources. In other words, do people that live near power lines tend to be of a certain gender, racial, age, ethnicity, etcetera. And I had not seen that type of information specifically published before. And the other -- one that you said represents a summary of EMF META analyses is not just a summary, it also has its own analysis, so that it's -- it's both a summary of the field to that point in time, plus some original work. And then the third is sort of a critical -- a critique of some of the potential confounders with this type of study.

MR. FITZGERALD: And please tell us what kind of literature search you made before you filed your original testimony?

DR. GINSBERG: Well, we had been accumulating studies, primary studies and secondary literature references over the course of the last 10, 12 years in this field. And we hadn't updated it specifically for this hearing, so we had references through the year 2000 on the relationship between leukemia and -- or other types of health effects and EMF, and weren't aware of the Wartenberg data study because that was 2001.

MR. FITZGERALD: And you have not -- is there any reason why you haven't filed all those other studies that you had in your office?

DR. GINSBERG: Oh, filed them -- most of those were on the record already. I mean these are noteworthy because these were not a part of anyone else's testimony or on the record and we felt like we -- these Wartenberg studies do add something to our database. And as the Siting Council's witness, we felt that they might also want to be aware of these studies.

MR. FITZGERALD: Alright. I'm -- I'm going to -- thank you, doctor. I'm going to object to receiving these three studies in and not just because I haven't had time to read them to cross-examine him about them, but they have not been made the basis of opinions he's expressed. He is not vouching for them. They're -- they're studies that he thought might be of interests that he found through doing a search for a particular author that he heard mention, but there's no representation that he is going to provide or has provided testimony that is particularly supported by these studies, that just means they come in on their own as something that's been published somewhere. And if we get into that, I think we -- we'll be bringing stuff in

by the car load. If a witness who is testifying to an opinion and wants to support it by something that he considers authoritative, well then we're into a different ballgame. But I don't think that these studies should be made a part of the record at this time.

MR. TAIT: You're making a distinction between administratively noticing governmental studies and individual studies such as these?

MR. FITZGERALD: Yes.

MR. TAIT: Yes.

MR. FITZGERALD: Scholarly works.

MR. TAIT: Mr. Schaefer.

MR. SCHAEFER: Yes, if I could be heard?

MR. TAIT: Of course you can be heard.

MR. SCHAEFER: Thank you, sir. The witness made it clear that he felt that these materials were relevant to the subject before the Council, that --

MR. TAIT: Well, why don't we ask him some questions before we make that assumption --

MR. SCHAEFER: No, I think he -- he already -- I think he said it, but I'll ask him again --

MR. TAIT: Sir --

MR. SCHAEFER: Sir, do you believe that the articles that you brought with you are relevant to

the subject matter of your testimony?

DR. GINSBERG: Yes, I do.

MR. SCHAEFER: And do you think they support and reinforce the conclusions you've reached and expressed in your testimony?

DR. GINSBERG: Yes, I do.

MR. SCHAEFER: And do you believe they're from a researcher who is recognized and well known in the field?

DR. GINSBERG: Yes. Several government agencies have used him specifically to help them analyze this particular issue.

MR. SCHAEFER: And in fact this is the author of one of the three META analyses in this area that exist, isn't that correct?

DR. GINSBERG: There are more than three META analyses in this area --

MR. SCHAEFER: Okay --

DR. GINSBERG: -- some are pretty old.

MR. SCHAEFER: Okay. But of the ones that have done --

DR. GINSBERG: Recently --

MR. SCHAEFER: -- 2000, there's Ahlbom, Wartenberg -- and is it Greenland?

DR. GINSBERG: Greenland.

MR. SCHAEFER: Okay. And so do you think this information would be both helpful in your expressing your opinion and helpful to the Siting Council in understanding this issue?

DR. GINSBERG: Yes.

MR. SCHAEFER: I believe it meets every standard for --

MR. TAIT: Doctor, do we have in the record those other META studies?

DR. GINSBERG: Yes, you do.

MR. TAIT: The other two that you mentioned?

DR. GINSBERG: That's right.

MR. TAIT: And --

MR. SCHAEFER: Can I just clarify -- I think what he may be referring to is in the record. They're in the appendix that we submitted to -- which hasn't yet been admitted into the record, but it's the appendix to the testimony of Drs. Bell and others that you'll hear tomorrow.

MR. TAIT: Okay. So they will be testifying to the authenticity of Dr. Wartenberg?

MR. SCHAEFER: As to his -- his role in

the field, his prominence in the field --

MR. TAIT: And that they relied upon his opinions?

MR. SCHAEFER: Correct.

MR. TAIT: Maybe we're anticipating the proper authentication of these articles --

MR. SCHAEFER: No, I think this witness has said that he's reviewed and relied upon them.

MR. TAIT: I don't believe he could have relied upon them because he didn't know they existed when he gave his testimony.

MR. SCHAEFER: No, but he is -- he is going to rely on them today as he supports that testimony and gives evidence to the Council.

COURT REPORTER: One moment please. (Pause). Thank you.

DR. GINSBERG: If I can clarify perhaps?

MR. TAIT: Yes, by all means.

DR. GINSBERG: There are a very limited number of META analyses. And my only purpose for bringing these Wartenberg studies forward was to just make sure that what we have in front of us to talk about is the -- amongst this very limited number, everything that I'm aware of at least that has been published that

constitutes that type of study, and there has been a debate about selection bias and how that may decrease the importance and relevance of some of the META analysis and the individual study findings, and it turns out that Wartenberg wrote a whole separate review discussion piece on that, that I do think is relevant. Now if I'm bringing it up in the improper manner --

MR. TAIT: It's not your fault and it's not your problem. Are the three META analysis that we've identified the basis of your current opinion?

DR. GINSBERG: Yeah, I would say that my opinion --

MR. TAIT: That's expressed in your testimony today?

DR. GINSBERG: Yes. I would say that my -- today's testimony, whatever questions and answers would come up, would lean as well on the Wartenberg study.

MR. ASHTON: Any other studies --

MR. TAIT: And that -- or any other studies that you are aware of and have looked at?

DR. GINSBERG: Yes.

MR. TAIT: And you hadn't looked at the Wartenberg study when you testified earlier?

DR. GINSBERG: That's correct.

MR. TAIT: Mr. Wertheimer, I see --

MR. MICHAEL WERTHEIMER: Just a couple of points. I support Dr. Ginsberg's effort to make these studies part of the record, and I'm not as particular about whether it's done by administrative notice or by some other means. I would like to just ask a couple of questions just to add to the reasons why I do think it should be part of the record. Dr. Ginsberg, were you here when the companies' experts, Dr. Cole, Aaronson, etcetera, testified, I think it was a month or two ago?

DR. GINSBERG: In March, yes, I was.

MR. WERTHEIMER: And do you recall at that time the testimony concerning the timing of studies and how some studies may be dated and, therefore, less reliable from those witnesses?

DR. GINSBERG: Well, I remember testimony from Dr. Cole to the effect that there were some early studies that led you to believe one thing and then some of the more recent studies to lead you in a different direction.

MR. WERTHEIMER: And their understanding of the studies that had been conducted in these fields, these Wartenberg studies that you're talking about, would not be considered data -- would be considered more

recent, is that fair to say?

DR. GINSBERG: It's slightly different because these are META analysis relying upon underlying studies that have come from all different dates. So these are just the latest analytical piece on some earlier field studies. Those earlier field studies have not been updated with a new field study.

MR. WERTHEIMER: Okay. And you've been asked by the Siting Council to appear and provide your expertise and the expertise of your department to the Council to aid in their process of addressing the sticky issues that are presented in this application, is that right?

DR. GINSBERG: That's right.

MR. WERTHEIMER: And you believe that these studies will help the Council understand those issues, is that correct?

DR. GINSBERG: That's correct.

MR. WERTHEIMER: Okay, thank you.

MR. TAIT: Would you identify those other two META studies besides the Wartenberg one you mentioned?

DR. GINSBERG: Yes. And I have copies here if they are not handy, but I believe they have --

MR. TAIT: Well, I understand Mr. Schaefer has attached those to his --

MR. SCHAEFER: The appendix --

MR. TAIT: -- appendixes.

MR. SCHAEFER: That is correct.

MR. TAIT: But, would you identify them for --

DR. GINSBERG: Yes. Okay, one is Greenland, et al --

MR. TAIT: Greenland --

DR. GINSBERG: Yeah, Green -- it's spelled just the way it sounds --

MR. TAIT: Okay.

DR. GINSBERG: -- Greenland, et al. And it's in the journal Epidemiology, Volume 11, pages 624 to 34, the year is 2000.

MR. TAIT: Okay. And the other one?

DR. GINSBERG: The other one is Ahlbloom -- Ahlbom, A-h-l-b-o-m, et al --

MR. TAIT: A-h-l --

DR. GINSBERG: -- b-o-m.

MR. TAIT: -- b-o-m.

DR. GINSBERG: Right. Et al. From the journal British Journal of Cancer, Volume 83, pages 692

to 698, and the year is also 2000.

COURT REPORTER: Excuse me, doctor, did you say b-o-m or b-a-m?

DR. GINSBERG: b-o-m --

COURT REPORTER: Thank you.

DR. GINSBERG: -- A-h-l-b-o-m.

MR. TAIT: And your opinion today is based upon your reliance -- in part upon your reliance upon these studies which you consider to be authoritative?

DR. GINSBERG: Yes, I do.

MR. SCHAEFER: Sir, if I could make one additional comment? All three studies are cited in the Applicant's application.

MR. TAIT: Mr. Fitzgerald, any --

MR. FITZGERALD: I have nothing further. My -- I'm wondering if what we're suppose to do here is to file copies of all of the studies that underlie --

MR. TAIT: That's what is concerning me, is to -- once we have administrative notice of governmental documents, we have a finite number of documents before us. And the ability of this Council to read all of these studies not being --

MR. FITZGERALD: If someone is going to testify about something and base it on I believe this is

because X, well okay fine, then we'll talk about it, but --

MR. TAIT: Well, I thought --

MR. FITZGERALD: -- I can back up a dump truck with a thousand studies --

MR. TAIT: Well, I thought Mr. Schaefer was representing that his expert witnesses would do just that. Am I incorrect, Mr. Schaefer?

MR. SCHAEFER: No, sir, you are correct.

CHAIRMAN KATZ: Mr. Schaefer, we're going to --

A VOICE: You need a microphone.

MR. TAIT: That your witnesses will be relying upon these precise studies, and there's a finite of studies of which you will have us look at?

MR. SCHAEFER: Correct. And I believe that this witness testified that in answering questions today, he intends to rely on these studies.

CHAIRMAN KATZ: But -- so can we take these studies in for what they are worth --

MR. SCHAEFER: Yes --

CHAIRMAN KATZ: -- with the understanding that the author is not here and that we will read this and we will read many other documents?

MR. SCHAEFER: Yes --

MR. TAIT: Well, my only caveat that I don't want to suddenly tomorrow have 55 other studies brought in on the subject. I understand from Mr. Schaefer that he doesn't intend to do so, that there's a limited number of studies upon which you are going to identify by author and -- do you understand our problem? We don't want to bring in the medical field that's in a library.

MR. SCHAEFER: No, I understand. But an issue before you is the health risk of EMF --

MR. TAIT: And we want to explore that thoroughly --

MR. SCHAEFER: And witnesses are -- none of the witnesses here have done independent research on that issue --

MR. TAIT: That's correct --

MR. SCHAEFER: -- they are all analyzing the same articles --

MR. TAIT: Now --

MR. SCHAEFER: -- and so I think for you to -- you don't have to read them, but you have them available to you in case you want to check what a witness said about what an article says.

MR. TAIT: I'm only interested in sort of controlling the record and -- we've identified some articles through this witness and through your witnesses that I think we'll take in as exhibits. My fear is that out of the woodwork will now come a medical library.

MR. SCHAEFER: Well, I don't anticipate a medical library, but there may be some additional articles based on his testimony that might be relevant.

MR. TAIT: Well, then we'll have to identify those particular articles.

MR. SCHAEFER: Exactly.

CHAIRMAN KATZ: Mr. Fitzgerald, is it true that you've already identified these articles in the application?

MR. FITZGERALD: It's not true that I have.

CHAIRMAN KATZ: Well, the application -- (laughter) --

MR. MARCONI: The application makes reference to them --

MR. FITZGERALD: I don't -- I don't know if they were or not. I know I've never seen them before. Maybe Dr. Bailey can tell us if he's -- if he discussed them in the application.

DR. BAILEY: I know -- I know one of the articles was cited in the application, but there are other articles which were provided here which I don't believe that we cited.

MR. TAIT: Okay --

CHAIRMAN KATZ: What I'm going to ask you to do before tomorrow morning is just check your own record on what the Applicant cited --

MR. TAIT: Yes --

CHAIRMAN KATZ: -- in relation to these --

MR. TAIT: I know Dr. Cole testified about META studies and I would hope he would -- if he wasn't referring to these, would review these and at some point give us his comment on these studies.

CHAIRMAN KATZ: Yeah.

MR. TAIT: Not at this point because it's the proper turn for it --

CHAIRMAN KATZ: What I'd like to --

MR. TAIT: -- but we would appreciate your --

CHAIRMAN KATZ: What I'd like to do is to delay taking into the record these three articles until tomorrow morning when at this point we'll get an indication from the Applicants if they've already cited

all three and --

MR. MARCONI: Madam Chair, may I make one additional point?

CHAIRMAN KATZ: Yes.

MR. MARCONI: Is -- I notice that there are a couple of court decisions involving the admission of scientific evidence, and I would invite counsel, overnight if you can, to take a look at these two cases in particular and any other ones. One of them is Daubert, D-a-u-b-e-r-t, versus Merrill Dowell Pharmaceuticals, which is a U.S. Supreme Court decision, 1993, 509 US 579, and then one State Court decision, which discusses that, State vs. Porter, 1997, Connecticut Supreme Court Decision, that's 241 Conn. 57. It appears that there is a Daubert test on the admission of scientific evidence. It might be helpful to the Council if you're able to discuss that tomorrow morning as far as whether these documents should be admitted or considered by the Council. I want to make sure we're fair to everybody.

MR. SCHAEFER: Yeah, no, I understand, and I'm prepared to discuss it now, but I'll be glad to discuss it tomorrow morning, those are well known cases in the field. I'd just point out for the assistance of

the Applicant, if they'd look at their application, Volume 6, page 104, it cites the two 2001 Wartenberg studies in the reference list.

MR. MARCONI: Okay.

CHAIRMAN KATZ: But there actually were three studies, Mr. Schaefer, so --

MR. SCHAEFER: They didn't cite the '93 study --

CHAIRMAN KATZ: Mr. Schaefer, you're not allowed to talk away from the mic.

MR. SCHAEFER: Sorry. I don't have a position of prominence here with everybody else, I have to walk each time. But the answer is the '93 study is not listed in the Applicant's references.

CHAIRMAN KATZ: Thank you for that clarification.

MR. FITZGERALD: It seems to me that if something is listed in the application, the study -- it's fair -- it's fair game to cross-examine the witness about the study --

CHAIRMAN KATZ: Yes --

MR. FITZGERALD: -- and to the extent that the study needs to be produced to do that, that's fine. My -- my only -- my only objection is to publications

sailing in here on their own when they haven't been tied to any prefiled testimony.

MR. MARCONI: Well, that's why I've invited counsel to look at these cases and discuss tomorrow morning, in light of what's been referenced in applications, the use of these studies so we can have -- both -- all counsel can have a chance to present their full discussion tomorrow morning.

CHAIRMAN KATZ: We are going to take this up first thing tomorrow morning if there's any other thoughts.

MR. FITZGERALD: Okay, I'll stop.

CHAIRMAN KATZ: Okay. At this point the -- besides these three studies, Dr. Ginsberg's testimony has been verified and he is available for cross-examination. If there's anybody who wishes to reserve their right to cross Dr. Ginsberg on clean-up day, we will ask him to come back on a date to be determined in June for further questions, but I'm going to start off, Dr. Ginsberg. In your prefiled testimony you indicated that the Department of Health tracks cases of childhood leukemia in Connecticut, correct?

DR. GINSBERG: That's correct.

CHAIRMAN KATZ: And they do it by town?

DR. GINSBERG: That's correct.

CHAIRMAN KATZ: Do we have any idea roughly how many cases of childhood leukemia there are a year in Connecticut?

DR. GINSBERG: We do. The rate is around -- is approximately one case per 10,000 children. So, I don't know -- multiply that out by the number of children.

CHAIRMAN KATZ: Do you have that number too?

DR. GINSBERG: It's a relatively small number, it's --

MR. ASHTON: (Indiscernible) -- order of magnitude of a hundred --

DR. GINSBERG: Yeah, it's on the order of magnitude of about a hundred a year --

CHAIRMAN KATZ: Okay --

DR. GINSBERG: -- or something along those lines.

CHAIRMAN KATZ: Okay. Roughly a hundred cases a year?

DR. GINSBERG: Um-hmm.

CHAIRMAN KATZ: Okay. So -- and you track it by town. Has the Department ever taken -- gotten a

list of what towns have 345-kV cables and ever seen if there's an association between towns with childhood leukemia cases and towns with 345-kV lines?

DR. GINSBERG: That analysis has not been done. And as a matter of fact when I talked to the team of registry people, who sit relatively close to where I do, about just getting data on childhood leukemia rates per town, that is a separate query which would take them some effort to produce. What we produce now is statewide statistics on age specific tumors. And then by town that is not age specific, so that would be a separate query that they would have to do.

CHAIRMAN KATZ: So childhood leukemia is lumped in with other leukemias in your -- by town?

DR. GINSBERG: That's right.

MR. EDWARD S. WILENSKY: Dr. Ginsberg, are there any clusters of childhood leukemia?

DR. GINSBERG: We are not aware of any. We are not aware -- we have had reason to look into the matter in a couple of isolated cases where there was a perceived or a concern that there was one, and we have done some analyses along those lines, along with breast cancer and other types of clusters in certain towns, and we have not been able to identify one.

CHAIRMAN KATZ: Mr. Emerick --

DR. GINSBERG: But again, we have not done the type of analysis that you're suggesting. And again, some of the literature that you have in front of you were studies specifically designed to look at EMF and childhood leukemia, not necessarily 345-kV lines and childhood leukemia.

MR. DANIEL P. LYNCH, JR.: Would -- would that study on EMF besides transmission lines also include distribution lines?

DR. GINSBERG: The literature that's reported has -- the way that those studies were done was making spot measurements so that whatever the EMF source was, you would get that result as part of your study. In other cases it was based upon wire code designs so that distribution lines as well as transmission lines would be part of that calculation.

MR. LYNCH: Thank you.

CHAIRMAN KATZ: Mr. Emerick.

MR. EMERICK: Yes. Dr. Ginsberg, in terms of childhood leukemia, how long has the registry been tracking that?

DR. GINSBERG: I don't specifically know the answer to that. I know that we've been publishing

reports since the 1980's, summarizing statewide statistics. So, I would guess that that's at least since the mid 80's.

MR. EMERICK: Is there a long enough period where there's any trend established in that information in terms of either increasing or decreasing levels?

DR. GINSBERG: I don't know. I have not seen that come up as a finding.

MR. EMERICK: Thank you.

CHAIRMAN KATZ: Dr. Ginsberg, if you're just tracking by town leukemia --

DR. GINSBERG: Um-hmm?

CHAIRMAN KATZ: -- would you expect that if we had a list of towns that had 345-kV lines, that we'd find -- is the database big enough so that if there was a correlation between leukemia and 345-kV lines, that we would see the correlation in Connecticut?

DR. GINSBERG: The difficulty with that kind of a basis for a study is that there is a small number of people that live close enough to the line that would be potentially impacted so that a town-wide statistic would dilute out that effect fairly readily and so you need to do a much more focused GIS type of study

which logs in people's address with their health outcome so that you can see the correlation between exactly where they live. And that's the way cancer clusters work. Also cancer cluster investigations need to look at mobility, how long has somebody lived in that location versus when did they get the cancer. It's a less big issue with childhood leukemia because the latency is fairly short, but still it is an issue, mobility is an issue. So it's not just simply looking at town-wide statistics and figuring out the problem or whether there is a problem, it's much more involved.

MR. ASHTON: And even if you could do that, and let's assume for the sake of argument that there is a causal relationship, which partly is the subject of this hearing, how can you differentiate casual effect from a transmission line and casual effect from other sources such as electric blankets, motors of one kind or another and the like?

DR. GINSBERG: If one did a very careful analysis as some of the literature studies -- as many of the literature studies have done, it's always a matter of an association that is established and that there are confounders in terms of someone's personal behaviors, how close a child sat to the refrigerator while playing jacks

for two years growing up --

MR. ASHTON: -- (indiscernible) -- my point --

DR. GINSBERG: -- to a TV set monitor or something -- you know, there's all those individual variables that will tend to create noise in your study and confound the study. So it's always -- in any study that you design unless you really put personal monitors on the children that end up with a disease versus controls, you're never going to get it down to that level of exposure analysis, especially in a population that's out in the community with workers in, you know, work places where they're exposed to energy fields or where they're exposed to chemicals. You can get a better shot at individual exposure metrics, but not in a population base study like this.

MR. ASHTON: Would you believe that using the numbers we've thrown around of roughly a hundred cases a year would provide -- is enough statistical basis to provide answers?

DR. GINSBERG: That would be difficult. It may be a small subset. What the literature consistently points out in this field is that the number of cases -- or the number -- I'm sorry not the number of

cases -- the number of individual households that are exposed above the cut-points in these studies that have milligauss exposures above 3 or 4 milligauss where the literature appears to be pointing towards an effect, that there's just a very small end so to speak, a number of subjects. So, I think one of the main limitations for doing a Connecticut specific study or a town specific study is that -- what would be the same limitation that many of the other studies have run into, whether we're talking about a Canadian study which looked at, you know, bigger areas than Connecticut, just not that many people exposed at the higher levels where you are more likely to see an effect and where you could start building up the statistics that you could really see a differential from control. That's one limitation.

The other limitation in the studies is that the exposure is highly variable. And as we talked about, any spot measurement in a house or following a child around for a couple of hours, you'll see peaks and valleys, so there's no true control group, and -- which makes again comparisons based upon spot measurements outside the home, you know, an uncertainty. And in my testimony and what I put on the record, I find that -- and our Department has found it fairly remarkable that

given these limitations, the small number of exposed people and the limitations in the ability to really accurately access day-to-day exposure, that it still is fairly remarkable that associations have been made fairly consistently across studies, at lease when you summarize them through a META analysis that they add up to an elevated -- a statistically elevation odds ratio.

CHAIRMAN KATZ: Would it be fair, Dr. Ginsberg, to say that DPH's recommendation of prudence avoidance is based not on what DPH is personally seeing in Connecticut but on the literature at large?

DR. GINSBERG: Yes, that's fair to say. And I -- and regarding prudence avoidance, it's easy to say avoid this, avoid that, this might be harmful, that -- we don't just give that advice out lightly because we can't tell people to just avoid everything. And you know, we have to make some decisions at some point about what's enough of an uncertainty, or enough of a potential risk, or that there's a sensitive population that may be of concern to say with this one you should be more careful. And that's where we had to come down with EMF, and in terms of residential, you know, buying houses and, you know, the residential marketplace.

CHAIRMAN KATZ: At this point, I'm going

to allow other parties and intervenors to cross-examine Dr. Ginsberg. First the Towns, Attorneys Ball, Boucher and Kohler, any questions?

MS. JULIE DONALDSON KOHLER: The Towns reserve the right to cross-examine until the cleanup day.

CHAIRMAN KATZ: Thank you. And Dr. Ginsberg, we're going to invite you back for that. Mr. Ball?

MR. DAVID BALL: No questions.

CHAIRMAN KATZ: Mr. Boucher?

MR. PETER BOUCHER: No questions.

COURT REPORTER: Would you --

CHAIRMAN KATZ: Mr. Ball said no questions, Mr. Boucher said no questions. The City of Meriden, Attorney Moore? Absent. Assistant Attorney General Wertheimer?

MR. WERTHEIMER: No questions, thank you.

CHAIRMAN KATZ: Mr. Wertheimer said no questions. The Communities for Responsible Energy, questions for this witness?

A VOICE: No questions.

CHAIRMAN KATZ: The Communities said no questions. The Office of Consumer Counsel, Mr. Johnson, questions?

MR. BRUCE C. JOHNSON: None.

CHAIRMAN KATZ: Mr. Johnson said no questions. ISO New England, absent. DOT, absent. The Town of Wilton, Attorney Frank?

MR. MONTE E. FRANK: No questions.

CHAIRMAN KATZ: Mr. Frank -- speaking for Mr. Frank, no questions. And I'll take that for the Town of Weston also, Mr. Ball --

MR. BALL: Yes --

CHAIRMAN KATZ: -- no questions. Mr. Schaefer, questions for this witness?

MR. SCHAEFER: Yes.

CHAIRMAN KATZ: Mr. Schaefer, we'll get you a seat.

MR. SCHAEFER: Well -- or is there a reason why the Applicant is not going first, I thought they were the first on the list?

CHAIRMAN KATZ: Well, I just haven't -- I just haven't called them yet.

MR. SCHAEFER: Okay. Where would you like me to do it from?

CHAIRMAN KATZ: How --

MR. SCHAEFER: I think it's a little awkward to be next to the witness in questioning him --

MR. ASHTON: He's friendly.

MR. SCHAEFER: Yeah.

CHAIRMAN KATZ: We'll -- Mr. Fitzgerald will give you a seat over here.

A VOICE: I'll sit on the end.

MR. MARCONI: And if you could just pull the microphone over.

MR. SCHAEFER: Good afternoon, Mr. Ginsberg.

DR. GINSBERG: Good afternoon.

CHAIRMAN KATZ: I'm going to correct you again -- you know, tomorrow we're going to call all your witnesses doctor --

MR. SCHAEFER: Doctor --

CHAIRMAN KATZ: -- something.

MR. SCHAEFER: I could do that just as a default. We're all -- Dr. Ginsberg, I didn't mean any offense by that.

Sir, it would be helpful to me in examining me if I knew -- were you here during the entire day of testimony the last time we had an EMF hearing?

DR. GINSBERG: Was that -- it was the day in mid March. Was that the last day?

MR. SCHAEFER: The day that you testified

--

DR. GINSBERG: Yes --

MR. SCHAEFER: -- briefly --

DR. GINSBERG: I --

MR. SCHAEFER: -- were you here the whole day?

DR. GINSBERG: I was here the entire day.

MR. SCHAEFER: And have you been here all day today?

DR. GINSBERG: Yes, I have.

MR. SCHAEFER: Okay, great. My understanding is that in your testimony -- I'm losing my -- in your opening statement that you gave during the hearing -- well, let me withdraw that and lay a foundation. You heard testimony from the Applicants' witnesses about the different components that go into an evaluation of whether there's an association between EMF levels and childhood leukemia. Is that correct?

DR. GINSBERG: That's correct.

MR. SCHAEFER: And you -- and that there are epidemiological factors that look at statistical associations, is that fair?

DR. GINSBERG: Okay.

MR. SCHAEFER: And then there are --

there's the medical side that was Dr. Aaronson's side, where you look at studies of the effect of EMF, medical causation, the studies of EMF on cells or on rats or mammals of that kind?

DR. GINSBERG: I would characterize those as toxicology studies.

MR. SCHAEFER: Toxicology, great, alright. And I'm going to focus with you first on the toxicology studies, okay --

DR. GINSBERG: Okay.

MR. SCHAEFER: -- and you -- you mentioned in your opening statement that very recent data on exposure of rats to EMF have found an increase in DNA damage that would be consistent with cancer and you cite a reference of Lei and Singh 2004, do you recall that?

DR. GINSBERG: Yes, I do.

MR. SCHAEFER: Okay. Now is it fair to say that this is a recent study that sheds some light on the plausible mechanisms by which EMF could potentially cause cancer in humans?

DR. GINSBERG: It's fair to say that it opens up some areas for further research in that direction --

MR. SCHAEFER: Okay --

DR. GINSBERG: -- yes, it does identify some possible mechanisms.

MR. SCHAEFER: Alright. Now -- and it deals with -- I guess you can use the term damage or mutation of DNA, is that correct?

DR. GINSBERG: Damage. It does not address mutation.

MR. SCHAEFER: Okay, damage. And if there's significant damage to DNA, can that cause abnormal cell function?

DR. GINSBERG: Damage to DNA of the nature that they're talking about here can cause anything from cell death to alteration in gene function, turning on of -- switching on of oncogenes, leading to cancer. There's many mechanisms that this type of DNA damage could lead to altered cell function, cell death, or cancer --

MR. SCHAEFER: Okay --

DR. GINSBERG: -- this study was not specific in terms of pointing out, you know, the end result of this kind of damage --

MR. SCHAEFER: Alright --

DR. GINSBERG: -- but that's well laid out in the literature.

MR. SCHAEFER: Alright. And in this

particular study that you cited, it dealt with exposure of living rats, is that correct?

DR. GINSBERG: Yes.

MR. SCHAEFER: To 60-hertz EMF for 2 to 48 hours?

DR. GINSBERG: That's correct.

MR. SCHAEFER: Okay. And the result was that that exposure caused single and double strand DNA breaks in their brain cells?

DR. GINSBERG: That's correct.

MR. SCHAEFER: Alright. And so my understanding is DNA has two strands. And this caused breaks in either one or both of those strands?

DR. GINSBERG: It caused breaks that could be characterized as both single -- it caused both types of breaks.

MR. SCHAEFER: Okay. And then the study went on and examined whether or not this effect was blocked by free radical scavengers and/or ion keylators (phonetic), is that correct?

DR. GINSBERG: That's correct.

MR. SCHAEFER: Alright. And what they found is that, in fact, the effect could be blocked by those things, isn't that correct?

DR. GINSBERG: Pretty much a hundred percent blocked, that's right.

MR. SCHAEFER: Okay. And so if you -- if we exposed the rat -- the brain cells of the rat to EMF, there were DNA damage which you see from the free radical production, is that correct?

DR. GINSBERG: The supposition is that the EMF in some way activates iron in the cell to undergo a reaction which would lead to free radicals. And if those -- if that occurs at a high enough level that cannot be scavenged by endogenous defense mechanisms, then that would lead to the type of damage they saw.

MR. SCHAEFER: Alright. And then they gave things that would block free radicals and turned on the -- exposed it to EMF and found that there was no evidence of DNA damage, is that correct?

DR. GINSBERG: That's right.

MR. SCHAEFER: Alright. And thus, is it fair to conclude from that, that free radicals caused by EMF cause DNA damage in mammals?

DR. GINSBERG: The study identified a number of previous studies which also explored this question with variable results. This study used particularly high doses in a particular method of dosing

that did produce -- from their publication I have no doubt -- no reason to doubt their data, it did produce that exact effect. Whether it would be reproduced in another laboratory with different equipment or in a different test system, given the history of these kinds of studies, I would like to see more data, but I brought it forward because this is very recent data and it does have more mechanistic information than I had seen previously, which gives it a little bit more plausibility.

MR. SCHAEFER: Okay.

MR. ASHTON: May I ask --

CHAIRMAN KATZ: Dr. Ginsberg, is it fair --

MR. ASHTON: -- a specific question please --

CHAIRMAN KATZ: Let me just -- one first --

MR. ASHTON: Oh, I'm sorry.

CHAIRMAN KATZ: -- and then you. Is it fair to say, Dr. Ginsberg, you're not ready to leap from association with rats to an association with humans based on this study?

DR. GINSBERG: I'm not that concerned

about the cross-species extrapolation. I mean we know a lot about cancer mechanisms from animals. Some of those are relevant to humans, some of them aren't. But this type of a basic generation of free radical type of damage we do believe cross species, you know, fairly well. So that that type of cross-species leap I'm not worried about. I'm more worried about the difficulties in reproducing some of the -- historically some of the animal studies in terms of generation of a field reproducibly in a laboratory environment and getting the results that add up to a body of evidence. And so far -- you know, this may be the beginning of a new -- of a body of evidence or a significant addition to the body of evidence, but it's still a little bit early to get good perspective on that. You know, I don't think that this one study is convincing on its own and I think does need replication.

MR. ASHTON: First of all, Dr. Ginsberg, I did not catch the name of the study to which this is referring. What -- please --

DR. GINSBERG: Sure. Okay, it's by Lei, L-e-i, and Singh, S-i-n-g-h. I believe I put it on the record the last time. It's Magnetic Field Induced DNA Strand Breaks in Brain Cells of the Rat. The citation is

Environmental Health Perspectives, January 2004.

MR. ASHTON: Okay. One other question. I didn't hear at all -- and I'm not obviously familiar with the study -- can you tell us a little bit about the intensity of the fields which were used here and the duration of the fields --

DR. GINSBERG: Yeah --

MR. ASHTON: -- how long they were applied, at what level?

DR. GINSBERG: They used a level of 100 milligauss --

MR. ASHTON: Um-hmm.

DR. GINSBERG: -- for 24 hours -- 24 to 48 hours. And when they went -- they -- the pieces of evidence that are somewhat compelling is that when they went longer, they saw more damage. So there was, you know, a dose response of that nature.

MR. ASHTON: So as I understand it then, these rats were subjected to that 100 milligauss field for a period of only 24 to 48 hours, is that correct?

DR. GINSBERG: That's correct.

MR. ASHTON: And then after that, they were dissected and examined?

DR. GINSBERG: They were -- yeah.

MR. ASHTON: Okay, thank you.

CHAIRMAN KATZ: Did they do any as a control, any studies with lower --

DR. GINSBERG: They had the same apparatus set up, but they had the fields cancel out, so there were just background milligauss.

CHAIRMAN KATZ: And did they find any DNA damage from background?

DR. GINSBERG: Yeah, there -- there is a level that this was increased above with the influence of the 100 milligauss. So yeah, there is a background level of DNA damage --

CHAIRMAN KATZ: No, I'm sorry, did they do as a control a lower milligauss level and find DNA damage also at that lower milligauss?

DR. GINSBERG: They didn't do a dose response in this particular study. They report on earlier work which did show -- or they claim shows higher levels of milligauss exposure for a shorter timeframe also inducing this effect in rats. And this was -- this study was intended to reproduce those findings on the one hand but then look at somewhat lower levels over longer times and will they get the same type of effect, and that's what they're reporting here.

CHAIRMAN KATZ: Thank you. Back to you, Mr. Schaefer.

MR. SCHAEFER: Thank you. Dr. Ginsberg, the -- in terms of the evaluation from an epidemiological and the public health perspective, in determining whether there is a correlation between EMF exposures at certain levels and childhood leukemia, a part of it is to see if there are epidemiological statistical correlations, is that correct?

DR. GINSBERG: It would be for having well controlled and well designed epidemiology studies that would find as you say a statistical correlation between the disease -- after controlling for all the confounders, yeah --

MR. SCHAEFER: Okay --

DR. GINSBERG: -- an influence of that exposure.

MR. SCHAEFER: Okay. And then -- you're aware that in a number of the government studies where they evaluate the relationship between EMF and childhood leukemia, they have commented on the fact that the -- I forgot the terminology you used for the other side, the medical side --

DR. GINSBERG: Toxicology studies?

MR. SCHAEFER: Toxicology. That there was not consistent evidence as to a plausible mechanism by which EMF would cause damage to cells that could cause a cancer, is that correct?

DR. GINSBERG: That's been commonly stated in the reviews --

MR. SCHAEFER: Okay --

DR. GINSBERG: -- and that -- that is pretty much the lay of the land.

MR. SCHAEFER: Okay. And the standard is not for a public health perspective that you have to prove how it's caused, but that it be plausible, that there be evidence of plausibility that the exposure to EMF could result medically in the damage that results into childhood leukemia, the standard is plausibility and not proof?

DR. GINSBERG: Well, you know, this is a somewhat tricky subject because we know that there are carcinogens in humans which are not necessarily animal carcinogens, difficult to prove in animals, so that requiring animal evidence for -- arsenic for example or Chromium 6 in the lung, you're not going to find that animal evidence for these chemicals, you're not going to find a mechanism that's well laid out for arsenic for

example. So we know that it's a human carcinogen from epidemiology studies. On the other side of the coin, you could get all sorts of associations in the literature or by designing any kind of a study that if you don't have some biological plausibility, you may be barking up all sorts of crazy trees --

MR. SCHAEFER: Okay --

DR. GINSBERG: -- and so --

MR. SCHAEFER: -- but I just wanted --

DR. GINSBERG: -- you know, there is a concern on both sides of that issue.

MR. SCHAEFER: Okay. But you just -- I just want to point out the term you just -- we're looking for biological plausibility, isn't that correct?

DR. GINSBERG: In general, that's correct.

MR. SCHAEFER: Alright. And DNA damage is a recognized cause of cancer, is it not?

DR. GINSBERG: It is recognized as on the pathway -- an initiating event on the pathway towards mutation and improper gene expression in cancer.

MR. SCHAEFER: Okay. And so that if in fact as this study you've been talking about indicates and that EMF exposure can cause DNA damage, then it's at least plausible and in fact maybe likely that EMF could

be the cause of childhood leukemia?

MR. FITZGERALD: (Indiscernible) -- a compound question.

CHAIRMAN KATZ: Can you rephrase please.

MR. SCHAEFER: Sure. We'll try again. You would agree with me that DNA damage is on the pathway to cancer, is that --

DR. GINSBERG: That's correct.

MR. SCHAEFER: Alright. And that therefore something that causes DNA damage is at least a plausible cause of cancer?

DR. GINSBERG: I would rather say that it's a plausible contributor. There are many -- cancer is multi-factorial and there are many other things that could either correct that damage or modify the ultimate response.

MR. SCHAEFER: Okay. So a contributor to cancer?

DR. GINSBERG: That's right.

MR. SCHAEFER: Okay. Do you have a copy of the Lei and Singh article with you?

DR. GINSBERG: Yeah. I would like to caveat it though by saying that these exposures are high, that the type of response and the type of effect seen is

something that normal cellular defense mechanisms will try to scavenge and eliminate. So that the effect at low doses from this kind of mechanism would be uncertain --

MR. SCHAEFER: Right --

DR. GINSBERG: -- you need -- other studies should follow up at lower exposures.

MR. SCHAEFER: And you'd need lower exposures over an extended period of time?

DR. GINSBERG: That's right.

MR. SCHAEFER: Okay. And just to --

DR. GINSBERG: And ideally in sensitive sub-groups as well.

MR. SCHAEFER: Correct. And you also need -- we don't know whether or not the results are going to be the same with a constant exposure over a long period of time or intensive exposure in shorter bursts? We don't know whether they're going to have the same result or different results?

DR. GINSBERG: Typically this type of mechanism where you're trying to exceed a threshold where you're generating a radical that could damage a cellular constituent and where there's a host defense mechanism, I as a toxicologist think in terms of the peaks being more important than the long-term average.

MR. SCHAEFER: Okay. And in this case then it would be -- for example, if there's a larger exposure at a peak load period, that may be more important than a lower exposure at a normal load period over an extended period of time?

DR. GINSBERG: One could speculate that from this study.

MR. SCHAEFER: Okay. Now sir, I asked you whether or not you have the article in front of you?

DR. GINSBERG: I do.

MR. SCHAEFER: Okay. If you could take a look at it and I want to bring your attention to a number of the references contained in the article, and it's at page 693 of the article. Are you with me?

DR. GINSBERG: Yeah -- my copy is an electronic printout from a prepublication version, so I don't have page numbers. My references start on page 19.

MR. SCHAEFER: That's fine, whether the references start --

DR. GINSBERG: Yeah, I have --

MR. SCHAEFER: -- at the end of the article it starts listing references.

DR. GINSBERG: Right, I have that.

MR. SCHAEFER: Alright. And -- again, I

don't know -- and I believe they're in alphabetical order.

DR. GINSBERG: That's right.

MR. SCHAEFER: Alright. Could you take a look at the two articles -- or studies referenced that are by a scientist by the name of Ivancsits -- I don't know if I'm --

DR. GINSBERG: Can you spell that?

MR. SCHAEFER: I-v-a-n-c-s-i-t-s.

COURT REPORTER: One moment please. (Pause). Thank you.

DR. GINSBERG: Okay, I'm looking at those two citations.

MR. SCHAEFER: Alright. And the first one, am I reading it right that this is a study done in 2003?

DR. GINSBERG: Yes, you are.

MR. SCHAEFER: Okay. And the description is Intermittent Extremely Low Frequency Electromagnetic Fields Cause DNA Damage in a Dose Dependent Way. Have I read that correctly?

DR. GINSBERG: Yes, you have.

MR. SCHAEFER: Would that be a relevant study to look at for the issues that are before this

Council?

DR. GINSBERG: That appears to be relevant.

MR. SCHAEFER: Okay. Have you had a chance to look at it?

DR. GINSBERG: I have not.

MR. SCHAEFER: Okay. If you could look at -- two down by the same author, there's a study in 2002 described as Induction of DNA Strand Breaks by Intermittent Exposure to Extremely Low Frequency Electromagnetic Fields in Human Diploid Fibroblast, okay --

DR. GINSBERG: That's correct --

MR. SCHAEFER: -- I read it right -- I didn't know what I was reading -- but can you tell me does that appear to be a study that would be relevant to the issues before this Council?

DR. GINSBERG: Yes, it does. You should realize that those are in vitro cell culture studies rather than in a whole animal study, but, yes, it's relevant in its own way.

MR. SCHAEFER: Okay. And explain to the Council what you're talking about an in vitro study and what the relevance is of that versus a full mammal study?

DR. GINSBERG: An in vitro cell culture study is one where cells are taken out of an animal. In this case they're fibroblast, which typically generates scar tissue after an injury. And these cells are grown, they're immortalized, they're grown in culture. You could just take them out of a minus 70-degree freezer and do experiments on them. Expose them to chemicals, they divide, they repair their DNA, they -- you know, they function in many respects like an intact cell, although there are obvious differences from in vivo. So in many many cases toxicology studies in the whole effort to get away from killing a lot of animals are more and more going to in vitro cell culture studies.

MR. SCHAEFER: Okay.

MR. ASHTON: Mr. Schaefer, just so we're all clear, this is a lay-agency where none of us are Ph.D.'s in biophysics or what have you, we have to wade through all of this, and particularly the sheer volume of paper, the Ivancsits article you referred to is behind Tab 22 in your Appendix No. 2 of that, correct?

MR. SCHAEFER: You know more than I do. Could you get the appendix and tell me?

A VOICE: Yes.

MR. SCHAEFER: It is, yes.

MR. ASHTON: Okay. If you have other articles to which you're going to refer that are in there, it would be helpful to us if we could just flag them so we know where to look for them --

MR. SCHAEFER: I'd be glad to --

MR. ASHTON: -- because I don't want to have to go down to -- to go on the internet to try to find these --

MR. SCHAEFER: No --

MR. ASHTON: -- please.

MR. SCHAEFER: I appreciate that. And these came up because of Dr. Ginsberg's testimony and so I hadn't done the cross-reference, but I appreciate -- I'll be glad to do that.

MR. ASHTON: That would be helpful if you could.

CHAIRMAN KATZ: Dr. Ginsberg, just to clarify, you indicated these in vitro cells are cells that are dividing, correct?

DR. GINSBERG: Yes.

CHAIRMAN KATZ: Well, one of the -- the previous testimony that we got said that children were more susceptible to leukemia -- or EMFs, and therefore leukemia, because their cells were still developing and

dividing more rapidly than adults. So would it be fair to say these in vitro cells are a more sensitive population of cells than perhaps --

DR. GINSBERG: It depends upon exactly how they -- I haven't read this particular study -- because you can expose cells in culture while they're fully plated out, they're quiescent, there's no room on the plate to divide so they're just sitting there, or you can plate them at a low density and let them divide and you can expose them during that stage of their growth and you could see different things going on. I don't know how they did this particular study.

CHAIRMAN KATZ: Yeah.

MR. SCHAEFER: May I proceed?

CHAIRMAN KATZ: Yes.

MR. SCHAEFER: Great. I just want to bring a couple of others to your attention. If you could look down the reference list, and they're in alphabetical order, there's another study cited by -- I believe it's the same author as this one, Lei and Singh in 1997. Do you see that, sir?

DR. GINSBERG: I do.

MR. SCHAEFER: And it described it Acute Exposure to 60-Hertz Magnetic Field Increases DNA Strand

Breaks in Rat Brain Cells. Do you see that?

DR. GINSBERG: Yes, I do.

MR. SCHAEFER: And by -- have you read that study?

DR. GINSBERG: I have not, but they summarize it in this paper.

MR. SCHAEFER: Okay. And then if you go down three, Lourencini, L-o-u-r-e-n-c-i-n-i --

DR. GINSBERG: Right.

MR. SCHAEFER: -- Dasalva -- I guess -- is that all one name -- so Lourencini Dasalva -- in 2000 a study described as The Effect of Electromagnetic Field Exposure on the Formation of DNA Lesions. Would -- I take it you have not read that study?

DR. GINSBERG: I have not read that study.

MR. SCHAEFER: By its description would it be relevant to the subject before this Council?

DR. GINSBERG: It appears that it would it.

MR. SCHAEFER: Okay. And just one other for now. The very last one on the list, Zmyslony, Z-m-y-s-l-o-n-y, described as DNA Damage in Rat Lymphocytes Treated In Vitro with Iron -- cations?

DR. GINSBERG: Cations.

MR. SCHAEFER: Cations, thank you -- and Exposed to Seven MT Magnetic Fields (static or 50-hertz), by -- that's a 2000 study, is that correct?

DR. GINSBERG: That's correct.

MR. SCHAEFER: And would -- by its description would that appear to be relevant to the issue before this Council?

DR. GINSBERG: That looks relevant.

MR. SCHAEFER: Okay. So it appears that there are studies in this field that are being done in the recent past and currently, is that correct?

DR. GINSBERG: Yes, it looks like there is a -- and as summarized in this article, a body of evidence that is worth evaluating in terms of some studies are finding effects, other studies did not find this effect, but overall it's an area where it looks like there may be some very useful mechanistic information.

MR. SCHAEFER: Okay. And just in the last one that I just butchered when I read it, that's dealing with white blood cells, isn't it?

DR. GINSBERG: Rat lymphocytes, that's correct.

MR. SCHAEFER: Okay. And when a white blood cell is damaged, is that how you get leukemia?

DR. GINSBERG: Well, it's in the bone marrow. I believe that the cell type that they used -- and again, I haven't read this study -- but typically the way these studies are done they use peripheral blood lymphocytes, which are the ones that are circulating all through the body not housed in the bone marrow. The ones in the bone marrow, the stem cells, which are the ones that would be the target for leukemiogenic age, so -- you know, these cells are going to die, you know, basically, so they're not -- or have a limited life span, and the potential for them to go on and form leukemia is not as great as if you actually damage the bone marrow.

MR. SCHAEFER: Okay.

CHAIRMAN KATZ: Dr. Ginsberg, are any of these studies that Mr. Schaefer is referring to -- it sounds like most of them -- the cells or the test mammal is having constant EMFs. Are any of them where perhaps they're exposed to EMFs for part of the day and then -- let's say eight hours of the day and then 16 hours of the day they're not exposed to EMFs? Have there been any studies that way?

DR. GINSBERG: There have been some intermittent exposure studies, yes.

CHAIRMAN KATZ: And have they shown

anything different than constant exposure studies?

DR. GINSBERG: I would have to review that literature more closely.

CHAIRMAN KATZ: I'd appreciate your thoughts on that --

DR. GINSBERG: Sure --

CHAIRMAN KATZ: -- later in the hearing process, perhaps not today but when we have you back in June.

DR. GINSBERG: There was -- there was in fact one citation now that I think of it, that -- that eludes to the fact that they didn't find an effect on continuous exposure and they found an effect when there was a cyclical exposure --

CHAIRMAN KATZ: Yeah, I --

DR. GINSBERG: -- and I can't remember if that was in cell culture or if that was in whole animals.

CHAIRMAN KATZ: I'd appreciate it if you could review that and I'll re-ask that next month. Yes.

MR. SCHAEFER: If you -- can I proceed? Okay. Doctor, if you could look back at the Ivancsits study that we talked about before and the one that was done in 2002, so I think it's the second one that I had brought to your attention.

DR. GINSBERG: Right, I see that.

MR. SCHAEFER: Okay. And doesn't this study deal with transient exposure to EMF and not with long-term low exposure?

DR. GINSBERG: In the title it says it was intermittent exposure and it says induction of strand breaks. From that title, I can't read much more into it than that, but it sounds like it would be germane to the question.

MR. SCHAEFER: Okay. I have no more questions. Thank you very much.

CHAIRMAN KATZ: Thank you, Mr. Schaefer. Mr. Fitzgerald, questions for this witness?

MR. FITZGERALD: Thank you. Good afternoon, doctor. Since -- how long has the issue of potential health effects of electromagnetic fields been investigated in this country?

DR. GINSBERG: In this country?

MR. FITZGERALD: Sure. Let's start there.

DR. GINSBERG: Since the late 80's.

MR. FITZGERALD: Okay. Since the late 80's? Weren't the -- weren't the -- okay, that's your answer --

DR. GINSBERG: That --

MR. FITZGERALD: -- since the late 80's. Okay, so that's going on 25 years. How many of these toxicological studies have been done in the course of that period of time to investigate this question?

DR. GINSBERG: I have not counted. There have been a variety of different studies from whole animal cancer bioassays to some of these kinds of cell culture and animal DNA damage assays. There have been studies done on all sorts of toxicologic end points. Many, many studies have been done.

MR. FITZGERALD: There have been -- there have been thousands, haven't there, doctor?

DR. GINSBERG: I -- I wouldn't hazard a guess. Many, many -- a large number.

MR. FITZGERALD: And if I were to take virtually any one of those studies, one individual study and say to you is the subject of this study relevant to the question, your answer would almost always have to be yes, wouldn't it?

DR. GINSBERG: In general.

MR. FITZGERALD: Okay. And -- so what people, including scientific consumers of this literature look to in the absence of being able to themselves review each and every one of these studies and evaluate it, are

the multidisciplinary reviews of the body of work, isn't that right?

DR. GINSBERG: Well, no, I wouldn't say that. A toxicologist would look at the field for him or herself and want to see if there's a positive -- oftentimes in toxicology it could be difficult to get a positive finding for one reason or another. And if you find a positive study, well then you might want to follow up on that and see what that means. Sometimes it might take many negative studies to counteract a positive study, it depends upon the field of research exactly that you're looking at --

MR. FITZGERALD: But my --

DR. GINSBERG: -- but you wouldn't necessarily just depend upon somebody else's review.

MR. FITZGERALD: But isn't it true, doctor, that -- I mean we've been -- we've spent the whole afternoon here basically talking about one study, right?

DR. GINSBERG: Basically, yes.

MR. FITZGERALD: Right, okay. And there are thousands of studies like that out there --

DR. GINSBERG: Not like this particular mechanistic focus on DNA strand breaks and looking at

ways that that can be prevented and looking at whole animal situations. So this -- this design has not been done thousands of times. I mean this kind of design has been done on the order of 10 or 15 times.

MR. FITZGERALD: Okay, and we'll come back to that, but the -- but there are thousands of toxicological studies concerning EMF and health effects?

DR. GINSBERG: Many, many studies.

MR. FITZGERALD: Yes, alright. And that body of evidence has been evaluated by committees of scientists working under the aegis of organizations such as the National Cancer Institute, the International Association for Research on Cancer, the National Institute of Environmental Health Sciences --

DR. GINSBERG: Um-hmm --

MR. FITZGERALD: -- and on and on, right?

DR. GINSBERG: That's correct.

MR. FITZGERALD: Okay. Now as you mentioned, there are some other studies that really are like this Lei and Singh study. This wasn't the first time that such reports -- that there has been a report of the results claimed in this study --

DR. GINSBERG: That's right.

MR. FITZGERALD: And indeed, Lei and Singh

themselves have reported similar results going back to 1997?

DR. GINSBERG: That's correct.

MR. FITZGERALD: And those earlier Lei and Singh studies have been the subjects of efforts by other laboratories to replicate them, haven't they?

DR. GINSBERG: I can't claim to know that literature that closely. Again as I said to the previous questioner, I haven't gone back and read.

MR. FITZGERALD: Okay --

DR. GINSBERG: There was a study on mice that I believe did not show this effect, but I believe there was another study that did show this effect, so it's -- there's been some variable results.

MR. FITZGERALD: Right. And -- but you don't know of any explicit efforts to reproduce the Lei and Singh reported results, the same experiment, the same --

DR. GINSBERG: I'm not aware of any that have done exactly this.

MR. FITZGERALD: Okay. You are aware though that the earlier Lei and Singh reports were included in evaluations of the science done by such agencies as the National Institute of Environmental

Health Sciences and the National Cancer Institute, aren't you?

DR. GINSBERG: Specifically, I have to plead ignorance. I'm not aware that they did use the Lei and Singh evidence or how they viewed the Lei and Singh evidence --

MR. FITZGERALD: Well --

DR. GINSBERG: -- I'd actually be interested in knowing what they thought of that '97 paper.

MR. FITZGERALD: Well, would you -- you're familiar with the NIEHS working group document --

DR. GINSBERG: Sure --

MR. FITZGERALD: -- aren't you? And maybe I can refer you to the list of --

MR. ASHTON: Use the mic, Tony.

MR. FITZGERALD: Let me refer you to the list of studies that was included in the evaluation. And there is one there from Lei and Singh entitled Acute Exposure to 60-hertz Magnetic Field Increases DNA Strand Breaks in Rat Brain Cells --

DR. GINSBERG: Yes, that's part of their reference list.

MR. FITZGERALD: Okay. And --

MR. SCHAEFER: Just for -- that's Item 2 in the Appendix --

CHAIRMAN KATZ: Thank you.

MR. FITZGERALD: Actually, it's not. Item 2 in the appendix is another NIEHS document. It's the -- it's the report issued by the NIEHS itself rather the detailed working group document.

And what was the conclusion of the NIEHS evaluators with respect to the results of the body of animal and -- well, with respect to the body of animal experimental evidence?

DR. GINSBERG: Basically, that the animal studies do not show an effect that would be -- that would be consistent with the effects suggested in humans.

MR. FITZGERALD: And Lei and Singh --

DR. GINSBERG: And that there's no --

MR. FITZGERALD: Sorry.

DR. GINSBERG: -- and no mechanism that can, you know, really -- that's emerging that could explain the human data.

MR. FITZGERALD: okay. And the Lei and Singh 1997 work on DNA strand breaks in rat brain cells was also considered among the many other studies in the International Association for Research on Cancer report

that was done for the World Health Organization in 2002, right?

DR. GINSBERG: Uh -- (pause) -- yes, that study is cited.

MR. FITZGERALD: Okay. And what was the conclusion of the IARC evaluators with respect to the body of animal evidence?

DR. GINSBERG: That it doesn't provide explanations for the link -- the possible link to human cancer.

MR. FITZGERALD: Indeed, they found that there was inadequate evidence to consider -- from animal studies to consider that EMF was a possible cause, right?

DR. GINSBERG: That's correct.

CHAIRMAN KATZ: Well, do you -- do you agree with that? I mean it sounds like it's making a case animals should have prudence avoidance, but it's not making the case that humans --

DR. GINSBERG: Well, it's -- what -- there's a couple of possible explanations or scenarios. One is that the animals are less sensitive than people, or that another scenario is that it's difficult in a laboratory animal setting or cell culture setting to produce the exposure in the right way for the right

timeframe to induce the effects that would lead you to believe.

I think the most compelling animal evidence is the whole animal two-year, long-term bioassays where essentially negative effects were found when animals were exposed, long-term chronic exposure, which is usually the gold standard in toxicology for proving whether or not something is a carcinogen. And the negative findings there, you know, I think has turned people in the field toward saying that the animal evidence isn't supportive of a link. However, as I said, there are examples with arsenic and chromium 6 in the lung and even cigarette smoking where it was very difficult, and still for arsenic and chromium 6 today animal models don't exist. So if you use that animal based gold standard, you could make the argument that cigarette smoking is not a human carcinogen or that, you know, chromium 6 is not a human carcinogen.

So, I have not personally been that concerned about the lack of supporting animal evidence. I brought forward this Lei and Singh 2002 paper to everyone's attention to show that, you know, the field is not closed, you know, the door is not closed to this type of research, that there are still some very interesting

studies going on that may add up to its own body of evidence to suggest that there's a better way to look at this issue in rats or in cell culture that may provide some explanations. Certainly their data from this study and from the '97 study are consistent with the cancer mechanism, although I think that the governmental and international reviews have focused more on these gold standard type of studies, which this is not that kind of a gold standard type of study.

CHAIRMAN KATZ: Thank you.

MR. FITZGERALD: I can't resist asking you about one thing that was suggested by your last answer. Tobacco in animals, didn't -- wasn't there an experiment in which dogs were --

DR. GINSBERG: Syrian Golden Hamsters was the animal model they came up with after years of trying to induce cigarette smoke induced cancer, lung cancer in rats, in mice. And the standard animal bio -- and Syrian Golden Hamsters will show it. And since then perhaps some other models have evolved, but this was years of research --

MR. FITZGERALD: Okay --

DR. GINSBERG: -- to come up with that one model.

MR. FITZGERALD: And IARC has also reported producing cancers in animals with arsenic, haven't they?

A VOICE: The National Toxicology --

MR. FITZGERALD: I'm sorry, the National Toxicology Program.

DR. GINSBERG: No --

MR. FITZGERALD: No?

DR. GINSBERG: -- the arsenic database is pretty much negative or equivocal in animals, certainly not the kind of findings clear-cut human carcinogen, it's -- there is no good animal model for arsenic induced --

MR. FITZGERALD: Okay --

DR. GINSBERG: -- skin or bladder cancer.

MR. FITZGERALD: Okay. Now -- now I'll come back to the point. I guess -- before we leave -- since we've been talking about this study all afternoon, I guess I'll ask you a question or two about it. It's fair to say, isn't it, that what we have here is an article in which the investigators, the authors of the article report that they observed more DNA strand breaks in the exposed rats than the number of DNA strand breaks they observed in the sham exposed?

DR. GINSBERG: That's correct.

MR. FITZGERALD: Okay. And how did they go about making this examination after the rats had been exposed or not exposed?

DR. GINSBERG: Well, the animals are taken out of the exposure chamber and they are necropsied and the brain is dissected, cells are freed up, and they do a comet -- it's called the comet assay, they look for -- on an agoras gel they look for how intact the DNA is as it migrates through an electronic field, so --

MR. FITZGERALD: Okay, so --

DR. GINSBERG: -- intact DNA has a certain band length that it travels down. And DNA that's clipped or damaged has many bands.

MR. FITZGERALD: Okay. Now when you say they dissect -- they don't just -- they take out the whole brain, do they? They don't just look at the whole brain?

DR. GINSBERG: I'd have to go back -- I believe they did the cerebellum.

MR. FITZGERALD: Do they -- do they --

DR. GINSBERG: And how they pick the cerebellum, I don't know.

MR. FITZGERALD: Actually, don't -- didn't they -- didn't they grind up the brain to get -- to break

it down into the DNA?

DR. GINSBERG: Yeah, there has to be some homogenization, sure --

MR. FITZGERALD: Right --

DR. GINSBERG: -- to purify the DNA of course.

MR. FITZGERALD: So you -- so I mean -- so they grind up the brain. Does that damage the DNA itself doing that process?

DR. GINSBERG: No. I've done this experiment myself in laboratories, a different method. We use alkylanalution (phonetic) to look at the intactness of the DNA. No, homogenization can be done under the proper conditions so that you don't destroy the subject matter.

MR. FITZGERALD: Okay. And then -- and then if it's done under the proper conditions, the investigators look at the --

DR. GINSBERG: I mean one would hope that it was proper conditions, they had a control that had some strand breaks, but, you know, not a huge amount.

MR. FITZGERALD: Well -- and then they look at the material as it travels through this gel and they make judgments based on the observed length of the

pieces as to what the extent of the damage is?

DR. GINSBERG: Right, how far the pieces migrate.

MR. FITZGERALD: And it's -- were another lab to try and replicate this work, they would do the same -- they would go through the same steps that the investigators reported they went through, and then they would make a similar judgment about how short -- or about the prevalence of short pieces of DNA in the gel?

DR. GINSBERG: Sure --

MR. FITZGERALD: Okay --

DR. GINSBERG: -- that would be what they would try to do.

MR. FITZGERALD: Let me talk briefly about the META analyses since you did bring them up. What -- what are the three recent META analyses to which you refer?

DR. GINSBERG: Wartenberg 2001, Greenland 2000, Ahlbom 2000.

MR. FITZGERALD: Alright. Now, you -- you describe the Wartenberg as the most recent of the three, but is there any original work that is included in the Wartenberg META analysis that was not in the other two?

DR. GINSBERG: Yeah. The main difference

as I see between the Wartenberg and the others -- actually, the others I think are a little bit better even though Wartenberg is more modern because Wartenberg did not have access to the raw data, so he had to use the cut points and some of the statistical approaches that were inherent in the underlying studies, whereas Greenland and Ahlbom actually were able to work with the data in a much more basis level.

MR. FITZGERALD: Okay. Now, would you -- in as few words as possible would you please just explain to the Council what a META analysis does?

DR. GINSBERG: A META analysis is an effort to combine epidemiology data sets from different studies basically to increase the number of exposed and unexposed individuals so that you're not relying on one study which may give you the wrong impression, but it allows you to pool many data sets or as many as you can gather and then see what the big picture is. And especially if you have the raw data, then you can combine that data based upon exposure above a certain level compared to an unexposed group. So it's a fairly powerful well accepted epidemiologic technique that allows the signal for many studies to come through in one analysis.

MR. FITZGERALD: Okay. And now these studies that were considered in the three META analyses were done over a period of 20 years or so, is that right?

DR. GINSBERG: Something like that.

MR. FITZGERALD: Okay. And if -- if you -- well, let me -- instead of asking you to make an assumption, I'll ask you a question. Dr. Cole said when he last testified that the history of the epidemiologic work in this area was that the earlier studies reported the most positive results, positive for multiple diseases, higher risk ratios, and that as the research has developed, the studies have become better designed and the results have been such as to show -- the associations previously showed had disappeared, or in the case of childhood leukemia associations previously reported became weaker in the successive studies looking at them as a group over time. That's a bad summary probably of what he said, but -- but what's your -- what's your view on that proposition?

DR. GINSBERG: Yeah, I don't reach the same conclusion. I think that there was a problem with an early study from Denver, the Wertheimer study, in that it was based upon wire codes, and found a very -- a fairly strongly positive finding that has not been

reproduced. And that has led some in the field and some reviewers to say that the older studies were more positive and the newer ones that are done better. And in this particular classification of studies where the results are based upon wire codes, if you factor -- if you equally weigh in the Wertheimer study and the more recent ones, you might reach that conclusion, that based upon wire codes, which is not a direct measurement of anything, it's just a calculation of fields, that no one has really been able to reproduce that initial Wertheimer finding. But in terms of actual field measurement studies, the literature for even, you know, more recent studies show elevated odds ratios, they're not always statistically significant, but that's the value of the META analysis, to pool all that data so you can get enough subjects involved so that you can hopefully attain statistical significance if it's there --

MR. FITZGERALD: But --

DR. GINSBERG: -- to give it a fair power -- to increase the power.

MR. FITZGERALD: But I'm not -- I'm not in this question talking about the META analysis, at least not yet. Is it -- is it a fact, as far as you know, that as time has gone on, the reported cut point at which an

excess of risk is said to be of observed for childhood leukemia for instance has increased?

DR. GINSBERG: The -- some of the earlier studies used a cut point of .2 micro-tesla, which is two milligauss. Other studies have used 3. The META analysis in 2000 done by Greenland, I believe used 4 milligauss as a cut point. So the cut points have bounced around. I've seen low and higher cut points. I haven't looked at that from a time specific trend.

MR. FITZGERALD: Okay. So let's --

DR. GINSBERG: But they do bounce around.

MR. FITZGERALD: That's fine. You haven't look at it from a time specific trend. And have you looked at the reported relative risks from a time specific trend?

DR. GINSBERG: Yes.

MR. FITZGERALD: And what have you found there?

DR. GINSBERG: Well, I could just give you some examples. And this is reading from Greenland, Table 5, which he reports from Coghill '96 on through -- let's see what's the -- no, the most recent study is McBride '99 -- 1999. He's got earlier studies. This is for magnetic field -- this is both measurements and wire code

studies, they're combined. But at any rate, for example, McBride in '99 the odds ratio was 1.45. That one wasn't significant. Let's see -- I'm sorry, no, that was London. London was 1.45. But the McBride in '99 -- London was '91. Okay, 1991 London, the odds ratio was 1.45. McBride in '99 found an odds ratio of 2.48. So, I don't see a -- you know -- and you can look at it -- you know, I don't want to spend the committee's time --

MR. FITZGERALD: Okay --

DR. GINSBERG: -- to go through every study -- but I don't see that time sequence that you're talking about.

MR. FITZGERALD: Now, let's -- let's assume, if you will, that there is such a pattern, that as time has gone on and studies have gotten better, less risks have been suggested. If that's the case, a META analysis that looks at the results of all of the studies and puts them all together takes -- does not account for that development, does it?

DR. GINSBERG: Well, let me put it this way, the META analyses, all three of them have done a couple of things to try to control for I think what you're getting at, which is influence -- a large influence by certain studies which would sort of outweigh

some of the more negative findings. They have done homogeneity tests, which looks for whether there are outlyer data sets. And those homogeneity tests were not statistically significant, which means that there was not a lot of heterogeneity, but that the studies all are within the same universe of data. In other words, there wasn't one really positive finding that was highly influential that would skew all the results. The META analyses have shown a fairly consistent type of response across most of the studies. And another way they have looked at this issue is they have excluded one study at a time to see how that would affect the odds ratio. And again there they find pretty much consistent statistically significant odds ratios. They do see, for example, with the UK study, which was a modern study, it was negative, when you exclude that from the analysis, the odds ratio goes up, but including it, the odds ratio is still statistically significant.

MR. FITZGERALD: So that -- and that's because all of the studies are weighted equally --

DR. GINSBERG: No, that's not true --

MR. FITZGERALD: according to -- please, please, just a moment -- the studies -- the studies are not scored according to when they were done --

DR. GINSBERG: No, they're scored, they're weighted based upon the variance in the study. The more variant the study, the less weight.

MR. FITZGERALD: Okay. And you mentioned the UK study?

DR. GINSBERG: Yes.

MR. FITZGERALD: Was that the largest study of childhood leukemia that has ever been done anywhere?

DR. GINSBERG: It has over 2,000 enrollees. I don't know if it's the largest that's ever been done, but it was large.

MR. FITZGERALD: Can you think of any that might have been as large?

DR. GINSBERG: Not offhand.

MR. FITZGERALD: Okay. Was that -- who was the principal investigator who designed that study and shepherded it through its early years?

DR. GINSBERG: I don't know who it was.

MR. FITZGERALD: Do you know who Sr. Richard Doll is?

DR. GINSBERG: Sure.

MR. FITZGERALD: And who's he?

DR. GINSBERG: He's a cancer

epidemiologist of well known reputation.

MR. FITZGERALD: Is he -- is he generally considered the foremost epidemiologist in the world.

DR. GINSBERG: He's -- as I said, he's well know and he's published many important works.

MR. FITZGERALD: Is he the man who developed the epidemiological studies that documented the relationship between smoking and lung cancer?

DR. GINSBERG: Actually, I think he was involved in those, yes.

MR. FITZGERALD: And the results of that single largest study of childhood leukemia ever done were negative for associations with EMF, right?

DR. GINSBERG: That's correct.

MR. FITZGERALD: Okay. Before we leave the META analyses, let's just see what the authors of the two who you identified as the better two say about their results. Do you have them in front of you?

DR. GINSBERG: Uh -- now I do.

MR. FITZGERALD: Let's look first at the Ahlbom and others study. In the last paragraph they summarize the whole shebang and say in summary, for exposure up to .4 micro-tesla, which would be 4 milligauss, our data demonstrate relative risks near the

no effect level for the very small proportion, 0.8 percent of subjects with exposure above .4 micro-tesla, the data show a two-fold increase, which is unlikely to be due to random variability. The explanation for the elevated risk estimate is unknown, but selection bias may have accounted for some of the increase. Right?

DR. GINSBERG: That's correct.

MR. FITZGERALD: And then if we look at the Greenland META analysis and go to their last paragraph, and the first half of that paragraph discusses the exposures below .2 micro-tesla. And then they go on to say in contrast both are categorical, and trend analyses indicate that there are some association comparing fields above 3 micro-tesla to lower exposures, although there is -- there are as yet insufficient data to provide more than a vague sense of its form and possible sources. Right?

DR. GINSBERG: That's an accurate reading. I'm just going to read ahead and see if they say anything else that we'd want to hear.

MR. FITZGERALD: Please do.

MR. ASHTON: Mr. Fitzgerald, if I could? I hate to be pesty about this thing, but again those two studies you were just referencing I believe, are they

not, No. 17, the Ahlbom study in Appendix No. 1 for the Ezra Academy applicants? Does that ring a bell with you?

MR. FITZGERALD: Yes, I was -- I was reading -- and the other one is the next one.

MR. ASHTON: And No. 18 is the Greenland study?

MR. FITZGERALD: Right.

MR. ASHTON: And what was the name of the British researcher you cited?

MR. FITZGERALD: Sir Richard Doll. Doll like a children's doll, d-o-l-l.

MR. ASHTON: Okay, thank you.

DR. GINSBERG: Yeah, that's fine, that reading of their summary is okay with me.

MR. FITZGERALD: Okay. You -- you gave the figure of 100 cases per year for childhood leukemia --

DR. GINSBERG: Roughly --

MR. FITZGERALD: -- in Connecticut. Now was that a -- is it rough because that was an estimate the you're making or is it just a question of recalling what the --

DR. GINSBERG: I just don't recall exactly what the data said.

MR. ASHTON: But Mr. Fitzgerald, I think that hundred was number I generated based on a Dr. Ginsberg figure 1 in 10,000 and I threw in a million for the population of children, so that's 10 --

MR. FITZGERALD: Okay --

MR. ASHTON: -- and that's where the hundred came in.

MR. FITZGERALD: So you lead him -- you lead him into it --

MR. ASHTON: I'm afraid I'm the bag-man on this.

MR. FITZGERALD: You get the credit and the blame --

DR. GINSBERG: Yeah, I remember a number of 23 cases for the zero to 3 or 4-year-old age group, and I don't remember the data -- it goes down beyond that.

MR. FITZGERALD: But it --

COURT REPORTER: One moment --

MR. FITZGERALD: -- but it --

COURT REPORTER: One moment please. (Pause). Thank you.

MR. FITZGERALD: But my -- I guess my point is there is an actual figure which you could look

up for us?

DR. GINSBERG: Sure.

MR. FITZGERALD: Yeah, okay.

CHAIRMAN KATZ: We're going to ask you if you could do that.

MR. FITZGERALD: And speaking of ages, what's the definition of childhood leukemia in terms of the age group?

DR. GINSBERG: Fourteen -- zero to fourteen.

MR. FITZGERALD: Zero to fourteen, okay.

DR. GINSBERG: Could I comment on some of the summary statements that were read out of these articles just to put them in perspective from my own reading of it? I mean you read those -- you don't want that?

MR. FITZGERALD: Well --

CHAIRMAN KATZ: Well --

A VOICE: They're already in, aren't they?

DR. GINSBERG: He's -- okay, fine.

CHAIRMAN KATZ: He can ask the question.

MR. FITZGERALD: In your -- in your testimony you included some fact sheets that were -- that you printed out from other State Department of Health

websites. Have you had an opportunity -- well, question withdrawn. In the course of doing that, did you notice that there were state agencies which in addition to that fact sheet format had more extended treatments of the EMF issue on their websites?

DR. GINSBERG: I don't know. I didn't do the search myself.

MR. FITZGERALD: Okay. Have you had occasion to see a document that was filed by the Applicants that pulls together material downloaded from state agency websites?

DR. GINSBERG: I'm aware that that exists. I haven't had a chance --

MR. FITZGERALD: But you haven't reviewed it --

DR. GINSBERG: I haven't reviewed it.

MR. FITZGERALD: -- okay. There's also another document that we filed that relates to Connecticut policy statements on EMF. Have you had an opportunity to look at that? And there's no reason why you should have, so --

DR. GINSBERG: No.

MR. FITZGERALD: Okay. Were you familiar with the fact that there was such a thing as a

Connecticut interagency task force on EMF?

DR. GINSBERG: Yes.

MR. FITZGERALD: And what's your understanding of the status of that body?

DR. GINSBERG: They have been tasked with updating the Legislature on the latest science. I believe they issued a report in 2000 as the latest summary report.

MR. FITZGERALD: And --

DR. GINSBERG: And as far as their activities, at this point I'm not sure exactly what their activities are today.

MR. FITZGERALD: Is the Department of Health one of the agencies on this task force?

DR. GINSBERG: Yes.

MR. FITZGERALD: And when you -- were you the principal draftsman of the EMF fact sheet that's on the DHS website now?

DR. GINSBERG: I reviewed it. I was not the principal draftsman, no.

MR. FITZGERALD: And who -- who was the principal draftsman?

DR. GINSBERG: Meg Harvey. She's in the room.

MR. FITZGERALD: Okay. Was it -- do you know whether it was meant to be consistent with the prior statements of policy by the interagency task force?

DR. GINSBERG: It was meant to reflect the latest understanding and the science in terms of the various questions that we get from the public, trying to answer their questions.

MR. FITZGERALD: Well --

DR. GINSBERG: It was not specifically meant to piggyback off of that 2000 report.

MR. FITZGERALD: Or of any --

DR. GINSBERG: But we were aware of what it said.

MR. FITZGERALD: Okay. As far as you know is the -- that EMF fact sheet consistent with --

DR. GINSBERG: Yes --

MR. FITZGERALD: -- those report -- okay. In your opening statement that you read the first time that you were here, you referred to some positive results -- let me just see what I can -- the primary studies and reviews in this area point to a possible link between EMF and two types of human cancer, brain cancer in adult electrical workers and childhood leukemia and then from general neighborhood household exposures. Is that a

current statement that there are -- that there are studies -- that the primary studies point to a possible link between EMF and adult -- and cancer -- brain cancer and adult electrical workers?

DR. GINSBERG: Yes, that's -- there have been positive studies.

MR. FITZGERALD: There were some early positive studies, but is there -- is there any kind of an existing consensus that you know of that this is a subject that is an open question?

DR. GINSBERG: Well, it's not -- certainly it's not the lead concern. But again from our perspective, positive findings are weighed sometimes more strongly than negative findings because we know that -- unless there's some reason to totally discount the positive finding, because a -- sometimes it's -- within the limits of the test system it's difficult to produce an effect, especially in epidemiology studies when there's potentially many confounders. And so I raised it -- or we raised it in that -- or I raised it in that statement to just show that there are data that have not been fully explained that suggest such a link --

MR. FITZGERALD: Well --

DR. GINSBERG: -- although I acknowledge

that there are studies that -- that do not -- that do not prove it out.

MR. FITZGERALD: Well for instance, the 2002 IARC monograph dismissed adult -- or occupational studies of brain cancer as showing -- as providing any evidence of carcinogenicity, didn't they?

DR. GINSBERG: They have discounted that.

MR. FITZGERALD: Okay. Now, you refer to general neighborhood exposures being associated with childhood leukemia. I take it from that, that you are including more than transmission lines in the term general neighborhood exposures, right?

DR. GINSBERG: Uh -- yeah -- I'd like to see exactly what I said.

MR. FITZGERALD: Yeah, it's on page 315 of the transcript if you have it, or --

DR. GINSBERG: Can you just read the statement?

MR. FITZGERALD: The primary studies and reviews in this area point to a possible link between EMF and two types of human cancer, brain cancer in adult electrical workers and childhood leukemia from general neighborhood/household exposures.

DR. GINSBERG: Right, okay.

MR. FITZGERALD: So that's -- that's a broader category of exposure than transmission lines?

DR. GINSBERG: That's right.

MR. FITZGERALD: Doctor, you are a toxicologist by training, is that --

DR. GINSBERG: That's correct.

MR. FITZGERALD: Would you tell the Council what the National Toxicology Program is?

DR. GINSBERG: It's a government based research agency that conducts many cancer studies as well as some non-cancer studies and genetic toxicology studies for -- for the -- for the National Cancer Institute.

MR. FITZGERALD: I was hoping you were going to keep talking long enough for me to get over there and get a paper. And the -- the National Toxicology Program maintains a list or develops a list of known human carcinogens and substances and agents and mixtures that are reasonably anticipated to be recognized as human carcinogens. Is that correct?

DR. GINSBERG: They do amongst various organizations. They're not the only one.

MR. FITZGERALD: Right. But I would assume that you being at toxicologist, you would be familiar with their list?

DR. GINSBERG: I'm familiar that it exists, sure. I don't know every chemical that's on it.

MR. FITZGERALD: Right. Do you know whether EMF is on there anywhere as either a known or a reasonably anticipated to be a human carcinogen?

DR. GINSBERG: No, I don't believe it's on their list.

MR. TAIT: Is it on any of the other lists that you're familiar with?

DR. GINSBERG: The one evaluation which has elevated EMF in terms of being a possible -- no, it's not been described as a known, which is higher to your level of concern, but it's been -- the working group for NIEHS used the IARC, which is the International Agency for Research on Cancer out of Lyon, France, it used their criteria, and they in a vote of 19 out of 28 scientists that were locked away for a week and a half reviewing all the evidence, they said that EMF fields are a possible human carcinogen, which is roughly their Group 2B. And that's not Shakespeare, that is Roman Numeral II and then a B, which means that it's not a known human carcinogen or it's not a probable human carcinogen, but it's a possible carcinogen.

MR. TAIT: And what was the vote on that

particular --

DR. GINSBERG: Nineteen out of twenty-eight.

MR. TAIT: So it was 19 to 9?

DR. GINSBERG: Uh -- yeah, that's the math. And there are other groupings that they could have called it. They could have called it a Group 3, which is an indeterminate level of --

MR. TAIT: Is that list in evidence?

DR. GINSBERG: The IARC list? No, but I just went on their website the other day to see -- and they have over 400 chemicals that are grouped into Group 3. They commonly put things into Group 3, IARC does, that don't have enough evidence to show clear carcinogenic effect. They have one chemical in Group 4, which is proven to not be a carcinogen. So they don't readily lump or put things into --

MR. TAIT: How many --

DR. GINSBERG: -- a coast is clear --

MR. TAIT: How many --

DR. GINSBERG: -- but they have many that are in this Group 3.

MR. TAIT: How many pages is this list?

DR. GINSBERG: The IARC list is on the

website -- long, yeah.

MR. TAIT: Okay.

DR. GINSBERG: Many, many chemicals.

MR. FITZGERALD: Where's -- where's coffee?

DR. GINSBERG: Caffeinic acid, I believe is either -- I believe it might be Group 2B.

CHAIRMAN KATZ: Which is the same group you said EMF is in?

DR. GINSBERG: EMF, yeah.

MR. TAIT: How long is that Group 2B list?

DR. GINSBERG: Two-hundred and fifty chemicals. There have been many chemicals tested. It just goes to show that not everything that gets tested in an animal test is a carcinogen. You know, there's a bit of a fallacy that if you give the animals such high does that they all get cancer. There are over 400 chemicals that have either been tested and were negative or that there isn't adequate data. But -- but the fact that -- it was noteworthy to us the fact that EMF was voted by this NIEHS panel to be in this possible carcinogen because they could have very easily put it into this indeterminate class, which is -- you know, it would have been an easy thing for them to do, but they decided to go

with possible.

MR. FITZGERALD: Do the IARC standards that you refer to require classifying something as possible if there is any epidemiology evidence to support that conclusion regardless of how strong the other categories, such as the animal studies might be?

DR. GINSBERG: It's not -- to my awareness, it's not that there is any epidemiology evidence, but that there is sufficient evidence to show an association that cannot be discounted or that there is animal evidence but no human evidence.

MR. FITZGERALD: One or the other?

DR. GINSBERG: Yeah, some epidemiology evidence.

MR. FITZGERALD: Okay, let's move on to another, and I hope the final -- or next to the final topic, prudence avoidance. In your opening statement did you intend to announce a new Health Department policy on EMF or were you sharing what you believe to be an existing policy?

DR. GINSBERG: Our statements -- we believe and our fact sheets have voiced public prudent avoidance as a general principle with this.

MR. FITZGERALD: And I'm going to refer

now to the 1993 task force -- interagency task force report that's been noticed and read to you a description of the term prudent avoidance that's in there. And just please listen to it and then tell me if this is your -- if it accurately reflects your understanding of the term. The popular term -- this is at page 1-5 in Reference No. 5 -- the popular term prudent avoidance -- which was rejected by the task force, but we'll leave that part out -- was developed by Dr. M. Granger Morgan and his colleagues Drs. Indirinere and H. Keith Florig (phonetic) at Carnegie Mellon University. The phrase prudent avoidance was coined when presenting policy options for risk management of public health effects from magnetic field exposure to the U.S. Congressional Office of Technology Assessment. The phrase prudent avoidance is originally defined as the avoidance of any field that can be avoided without significant cost to the quality of life. In their presentation at the First World Congress on Electricity and Magnetism in Biology and Medicine, June 1992, Dr. Indirinere emphasized the following, it is not the reduction because we don't know what reduction of exposure means, what is implied is that scientists cannot assess EMF risks using present risk assessment techniques because crucial information is lacking, the standard

assumption that more is worse may not apply. Morgan and colleagues suggest that we look systematic for strategies which can keep people out of 60-hertz fields arising from all sources, but only adopt those which look to prudent investments given their costs and our current level of scientific understanding about possible risks.

DR. GINSBERG: Okay. Our advice to the general public is with regards to -- or has traditionally been with regards to real estate purchases where they have the option to buy the house that's right next to the power line or buy the house that is -- or buy some other house. And we try to educate them to the issues, give them -- you know, the decision is theirs, but we -- but we do say that with this -- with given the uncertainties with this issue, that less exposure is better than more exposure just because we can't answer all your questions. They're calling us with questions we can't -- and believe me as a state health agency, we do not like to say we don't know, we like to give people very clear -- we don't like saying it's an open question, we like saying yes we know and avoid it, or yes we know and it's fine. And we have many things that we say that about. So when we say it's an open question and prudent avoidance regarding your real estate decisions, that's a

difficult risk communication message but one that we feel we need to do in this case.

MR. FITZGERALD: Do you understand the policy concept of prudent avoidance to refer to the prudence of making an investment to avoid exposure?

DR. GINSBERG: Yes.

MR. FITZGERALD: Okay.

(Gavel)

MR. FITZGERALD: In your --

CHAIRMAN KATZ: Mr. --

MR. FITZGERALD: -- opening statement --

CHAIRMAN KATZ: Mr. Fitzgerald --

MR. FITZGERALD: Yeah?

CHAIRMAN KATZ: We're overdue for our break --

MR. FITZGERALD: Yeah.

CHAIRMAN KATZ: -- and I'd like to break at this time. And I'd like to resume -- it's -- I have 3:05 -- I'd like to resume at 3:15.

MR. FITZGERALD: And just for the benefit of the others, I've got just like one or two -- one question maybe when we come back --

CHAIRMAN KATZ: Okay --

MR. FITZGERALD: -- so that the next

person --

CHAIRMAN KATZ: What we're going to do is after Mr. Fitzgerald finishes cross, we're going to go to Miss Randell I guess and then Mr. Cunliffe. And then after we finish with Dr. Ginsberg, we're going to procedural motions. So 3:15 please.

(Whereupon, a short recess was taken.)

CHAIRMAN KATZ: I'd like to resume at this time. Mr. Fitzgerald, if you could continue.

MR. FITZGERALD: Might I address the Chair first?

CHAIRMAN KATZ: Sure.

MR. FITZGERALD: I was -- you know things have unfolded a little differently than we anticipated today and I know that Mr. Carberry is not going to be available tomorrow, although of course he'll be available down the road, and I was -- Dr. Aaronson would very much like not to be available tomorrow if it could possibly be arranged, he has some things to do back at Mount Sinai. So, I just wondered if it might be possible to take a poll to see if the possibility might be of polishing them off this afternoon.

CHAIRMAN KATZ: Can I ask the parties and intervenors if they have a problem that after we finish

with Dr. Ginsberg if we do Dr. Aaronson and Mr. Carberry? Is there anyone who that becomes problematic? I'm going to take silence as acquiescence. Mr. Wertheimer, you want to be heard?

MR. WERTHEIMER: Yes. No problem with Dr. Aaronson. Mr. -- with Mr. -- Dr. -- Mr. Carberry --

A VOICE: We're all doctors -- (laughter) --

MR. WERTHEIMER: I don't have a problem with him -- I may have a couple of questions that he would be the right person to answer, but I think some of these issues will recur. As long as -- if he -- if we can't do it, they could turn it into a homework assignment that he could bring in and we could address later, I have absolutely no problem with that, and I think that might be the way to go.

CHAIRMAN KATZ: Is that for Dr. Aaronson or Mr. Carberry?

MR. WERTHEIMER: Mr. Carberry.

CHAIRMAN KATZ: Okay.

MR. FITZGERALD: Oh, yeah, that's -- that's no problem, yeah.

CHAIRMAN KATZ: Yeah. We own Mr. Carberry, so he'll be back in -- he'll be back in June.

(Laughter).

Okay, what I'd like to do then -- let's -- why don't we quickly finish up with Dr. Ginsberg and then we will go to those other witnesses. And somewhere in there we've got to discuss these procedural motions. And all this happens before 5:00 o'clock.

MR. FITZGERALD: Right. I'm going to -- I'm going to be true to my word, I just have one question. Dr. Ginsberg, you are familiar I think judging from your testimony --

CHAIRMAN KATZ: Can you lean in a little more to the mic.

MR. FITZGERALD: You are familiar I think in a general way with the Council's best management practices?

DR. GINSBERG: With the Siting Council's --

MR. FITZGERALD: Yeah.

DR. GINSBERG: Yes.

MR. FITZGERALD: Yeah. And as we left off, we were talking about prudent avoidance. And in your judgment would the employment of best management practices in the design of a new line that was to be added to an existing right-of-way so that the magnetic

fields associated with the right-of-way would not be increased or would in fact decrease as compared to existing conditions, would that be an example of prudent avoidance?

DR. GINSBERG: Well, we never said in our on the record testimony that the Siting Council should try to decrease fields from what they currently are. What our point is is that best management practices should be used to minimize any increase and to keep in mind the potential health risks and what background levels tend to be and try to strike that balance so that there's minimal exposure or minimal increase in exposure.

MR. FITZGERALD: No, I understand that. And I didn't mean to attribute to you the position --

DR. GINSBERG: Oh, okay, I'm sorry --

MR. FITZGERALD: -- that the fields had to be decreased. My question really was asking you to assume in fact that could be done, that existing fields on a right-of-way through design of a new line could be kept constant or decreased --

DR. GINSBERG: Yeah, I --

MR. FITZGERALD: -- as compared to the fields that would be there with just the existing line.

DR. GINSBERG: Right, I understand that.

MR. FITZGERALD: Okay. And you know, would that be an example of prudent avoidance --

DR. GINSBERG: Yes --

MR. FITZGERALD: -- the way you define it?

DR. GINSBERG: Yes.

MR. FITZGERALD: Okay.

CHAIRMAN KATZ: Thank you. Miss Randell, questions for this witness?

MS. LINDA RANDELL: Dr. Ginsberg, you mentioned coffee as a --

CHAIRMAN KATZ: Just a second.

A VOICE: She's on.

MS. RANDELL: I'm on?

CHAIRMAN KATZ: Start -- okay, start over please.

MS. RANDELL: Okay. Dr. Ginsberg, you testified you thought coffee was a Group 2B possible carcinogen for IARC, I-A-R-C. Do you recall that?

DR. GINSBERG: Yes.

MS. RANDELL: Is another one of them pickled vegetables, is that a 2B possible carcinogen?

DR. GINSBERG: I don't know if that's on the list or not, I'm sorry.

MR. LYNCH: And would french fries

according to the State of California now be on that list -- (indiscernible, laughing) --

DR. GINSBERG: There are natural carcinogens in baked products. And in french fries acrylomog (phonetic) has reared its head, yes, as being something to worry about.

CHAIRMAN KATZ: I know it's already on South Beach.

MS. RANDELL: With respect to the fact sheet that the Department of Public Health issued in January of '04, am I correct that that replaced another fact sheet?

DR. GINSBERG: Yes, it did.

MS. RANDELL: And when was that other fact sheet issued?

DR. GINSBERG: I would have to venture a guess about 1997, '98, that timeframe.

MS. RANDELL: And prior to issuance of the fact sheet by the Department of Health was the Connecticut interagency task force consulted?

DR. GINSBERG: We had -- at the time that the 1997 or '98 fact sheet was created, one of the people involved from DPH on that task force helped create that fact sheet. The task force at this point is not that

active and so we did not -- for this most recent fact sheet we did not contact them.

MS. RANDELL: Well, let's go back then. For the 1997 vintage fact sheet, the task force had been consulted?

DR. GINSBERG: Not in a formal way no, but one of the -- as I said, one of the people that helped create that was working with the task force as a DPH representative.

MS. RANDELL: And so the task force actually did see an advance copy of it and it was discussed with them, wasn't it?

DR. GINSBERG: I couldn't tell you for sure.

MS. RANDELL: And you also then don't know whether the advisory committee to the interagency task force was consulted with respect to the prior -- the 1997 vintage fact sheet?

DR. GINSBERG: I couldn't tell you for sure.

MS. RANDELL: And prior to the '97 fact sheet, was there another fact sheet?

DR. GINSBERG: I don't know.

MS. RANDELL: What is your understanding

on the task force, the interagency task force not being that active right now?

DR. GINSBERG: Well, the legislative mandate to update the Legislature when there's substantial new studies and evidence is something that they monitor and will come forward, but there hasn't been a mandate or an updated mandate from the Legislature to do anything in the short-term. The Legislature is not saying we need another report in the next six months or year because there's breaking news or something like that, so you know it's -- they're -- they can be assembled or they will continue to monitor the situation.

MS. RANDELL: Thank you. No further questions.

CHAIRMAN KATZ: Thank you. Is there any -- before we go to Mr. Cunliffe, was there any party or intervenor I did not call upon for cross-examination of Dr. Ginsberg? Okay. Mr. Cunliffe.

MR. FRED O. CUNLIFFE: In the DPH fact sheet you use the term high voltage. Do you have a definition for high voltage?

DR. GINSBERG: That is just more of a generic term. We don't specifically define it as above a certain -- generally we think of it as being above the

standard distribution lines that go down the street, so that it would be, you know, on the order of a couple of hundred kilovolts, but, you know, not -- or at least -- at least more than a hundred kilovolts I would think, more than what's common on street corners.

MR. CUNLIFFE: Okay. And you've identified a distance of 300 feet. How was that determined?

DR. GINSBERG: That's based upon a chart from a study that was reported. I can't remember the exact pamphlet or the exact document now, but it shows the decrease in distance with -- I'm sorry, the decrease in EMF with distance from various configurations and various power lines. And it showed that even the strongest source, maybe a couple of hundred kilovolts, that even 300 feet out you would be relatively close to background, below -- around a milligauss. So based upon that data, we thought that as a generic rule of thumb you could use 300 meters.

MR. CUNLIFFE: Is that document readily available to you?

DR. GINSBERG: Yes. I could provide that --

MR. CUNLIFFE: Could you provide that to

the Council?

DR. GINSBERG: Sure.

MR. CUNLIFFE: Thanks. You just used the term meters. Do you want to restate that as feet?

DR. GINSBERG: I'm sorry. Three hundred feet, yes. Thank you.

MR. CUNLIFFE: And could you speak to the relationship between increased use of electricity and leukemia rates?

DR. GINSBERG: Yes. Some -- some people have said that since leukemia rates in children don't go up in the same -- or along the same curve as the increase in energy and electricity by our society, that that's evidence that there's not a link. And there's many factors of course involved in children getting cancer and also there's -- which would be outside of that relationship that may make that relationship not be one to one. But also perhaps more importantly that the way that there's been shielding of appliances so that -- such that around the home exposures have changed over time so that you can't just say that because there's increased energy use that there's increased EMF exposure to children. So NIEHS has a nice little section in their fact sheet on why you wouldn't necessarily see that kind

of a correlation.

MR. CUNLIFFE: And have any of the studies made reference to that discussion as a potential out -- you know, have you --

DR. GINSBERG: Have any of the studies? No --

MR. CUNLIFFE: Have any of the studies talked about increased use of electricity versus any of the rates that they've seen in their studies?

DR. GINSBERG: No, because they're trying to measure EMF directly or through some calculation and they're just not just looking at a generic energy use type of approach.

MR. CUNLIFFE: And the -- again the fact sheet uses a level of 3 milligauss. Have any of the studies targeted a 1, 2, 3, 4, 5 milligauss as the source in their study? Do they use 3 milligauss and study cells that way?

DR. GINSBERG: Right. The way that most of the studies are done is by setting up a cut point between those who are more highly exposed and those who are less exposed knowing that we don't have a true control group, so you have to take the whole population of exposure and say below this cut point we're going to

say they're lumped into the low group and above that is the high group.

And one of the META analyses, I believe it was Ahlbom, used 3 milligauss as a cut point and they found an odds ratio of 1.87 for those, which was statistically significant, for the children that were exposed above 3 milligauss they had that increased odds ratio. Another study used 4 milligauss as a cut point. Other -- the UK study, for example, used 2 milligauss as a cut point, which would tend to dilute out some of the higher level of exposure because you're now including children who are exposed at 2 and 2 and a half and 3 milligauss. However, a reanalysis of the UK study did use I believe 4 milligauss as a cut point and still it was a negative study, so -- but anyway, a cut point is important. You can -- if you use too low a cut point, you may be diluting out your effect, but you would be increasing the number of people in that group --

MR. CUNLIFFE: But this cut point appears to be consistent through many studies --

DR. GINSBERG: Not necessarily. Again, it's a mixed bag. Many studies have used 2. The META analysis -- one META analysis has used 3. Some of the individual studies I believe have used 3. And I've also

seen 4 used. So what -- what is interesting in terms of where the effect seems to be occurring -- where the association seems to be occurring is that in the Greenland META analysis they average the exposure seen in the above fore-group, and it was close to six, it was about 5.7 or 5.8 milligauss that was the average level of exposure in those children that had an elevated odds ratio that was close to 2. So rather than just using the cut point, which is the bottom of the window, the average of that window was close to 6.

MR. CUNLIFFE: Thank you. Those are my questions, Chairman. Mr. Erling, any questions?

MR. ROBERT K. ERLING: Yes. Dr. Ginsberg, while you're here today, could you just summarize for us under oath what your own personal recommendations are to the Council in terms of this specific project?

DR. GINSBERG: Sure.

CHAIRMAN KATZ: And if there's a target number --

MR. ERLING: Yes.

CHAIRMAN KATZ: -- please tell us?

MR. ERLING: Yes.

DR. GINSBERG: If I can have the opportunity to explain what I'm about to say, I think

that would be helpful. Prudent avoidance to the point where -- well, let me -- let me back up a second -- any increase in exposure to a carcinogen that specifically targets children is a potential health concern. We don't have absolute proof that EMF is a human carcinogen or child carcinogen. What we have is a lot of uncertainty. That uncertainty increases above 3 to 4 milligauss. There's fewer subjects in those studies. We don't have a lot of statistical power in that range. And even with those limitations there is a suggestion of a signal for an effect coming through when you combine 10 or 15 studies together. So in that range, above 3 to 4 milligauss, we can't answer somebody's question on the phone and say is my child safe in that environment, we cannot say with certainty, with the kind of certainty that we as a health department would like to give that that is a safe situation. We can't say that your child is going to get cancer or that there's a certainty of a risk, but we can't give them that kind of warm fuzzy no problem buying that house, no problem living there, no problem allowing your child to build a tree fort, you know, near those lines. So -- you know, we are a -- my unit is a risk assessment unit, we are not risk managers. We do not set policy. We assess risks and try to

evaluate the decrease or increase in risks from certain practices. So you know, it's really not our role to set policy or to make policy statements. But when it comes to, you know, advising the public, you know, we're sort of left with that responsibility and we do the best we can with it.

So given those caveats, I would have to say that anything that significantly increases background exposures that the general population currently can be expected to -- and by background, anything in the 1 -- in the .5 to 2 and a half to 3 region -- I think at 3 you're in the 95th percentile from national statistics that I've seen for background. Anything that's, you know, getting in the 5 or 6 range really starts becoming much more uncertain, definitely out of the background realm, even in the 99th percentile case, and we have less and less confidence that we can say that there's safety there.

MR. ERLING: Are you talking about intermittent exposure now, or --

DR. GINSBERG: I'm talking about the long-term average.

MR. ERLING: Long-term, alright, um-hmm. What about distance too --

DR. GINSBERG: And peak, you know, we're

not --

MR. ERLING: -- are you comfortable with 300 feet --

DR. GINSBERG: -- we're not making a statement about short-term peaks. Again, the epidemiology studies have operated on averaging exposure -- well, actually many of the measurements were short-term, 24 to 48 hour measurements, but they were meant to be for continuous exposure, so we're assuming that those studies tell something about continuous exposure and a possible link to childhood leukemia. And I'm sorry, what was --

MR. ERLING: Yes. And what about distance, are you still comfortable with approximately 300 feet?

DR. GINSBERG: Well, that -- that's a matter of field strength and, you know, how strong the source is. And if we're saying that -- you know, doubling the milligauss level, you know, if average background is 2 or 3 and you're up to 5 or 6, you don't need to have that distance issue as part of it, you could just say we -- you know, the main criterion is whether you're at 5 milligauss or whether you're at 1 milligauss and not whether you're 300 feet from the source or 100

feet from the source. You know, it's a different determinate.

MR. ERLING: Thank you.

CHAIRMAN KATZ: Just to follow up on that, Dr. Ginsberg, for example, let's say a child is -- I'm doing my math quick here, so I hope I'm right -- 168 hours in a week and a child is exposed to a higher milligauss for let's 40 hours of that week. So when you calculate their long-term exposure, are you calculating 40 hours at a certain milligauss plus so many hours at another milligauss and then coming up with an average?

DR. GINSBERG: That would be the time weight averaging approach, right.

CHAIRMAN KATZ: Okay. So in that thing then perhaps is it prudent for the Council to look differently at, you know, homes where a person might have longer exposure than institutions where they might have shorter daily exposure?

DR. GINSBERG: That's correct.

CHAIRMAN KATZ: Okay, thank you. Mr. Emerick.

MR. EMERICK: No questions, thank you.

CHAIRMAN KATZ: Mr. Tait.

MR. TAIT: No questions.

CHAIRMAN KATZ: Mr. Ashton.

MR. ASHTON: You lose, I have a couple. (Laughter).

CHAIRMAN KATZ: No, we all gain, Mr. Ashton.

MR. ASHTON: There'll be a hot debate on that I'm sure. A few questions. Just to put this more in perspective, you have a unit that's risk assessment and that's your stick. As I would view your role, and please correct me if I'm wrong, you have to worry about a host of things that affect human life as we know it in Connecticut --

DR. GINSBERG: That's correct --

MR. ASHTON: -- exposure to God knows what. First of all, how many people are there in your risk assessment unit?

DR. GINSBERG: There's about nine.

MR. ASHTON: About nine people.

DR. GINSBERG: Yeah.

MR. ASHTON: And how much of their collective time in a year, before we got into the midst of this hearing, which has taken a lot of time, do you spend on EMF matters?

DR. GINSBERG: We probably -- in certain

seasons we spend more in terms of talking to the public about their questions. Certainly in the spring we get a lot of questions about EMF, and anyone who's on phone duty needs to answer the question. In terms of actually doing research and mining the literature and coming up with a new fact sheet, etcetera, you know, that's --

MR. ASHTON: I'm thinking more of the latter work, the research, the digging into the problem as you perceive it. What percent of your time -- of the unit's time roughly is spent on --

DR. GINSBERG: That -- you know, we spent an awful lot of time last winter, November into January redesigning our fact sheet, getting quality assurance on it, you know, passing it through various parties, doing the research to update it. So at that point in time there was a bolus of effort. Since we've done that, we're not going to spend a lot of time researching it, except to come to, you know, this hearing.

MR. ASHTON: Was that prompted by this docket?

DR. GINSBERG: No, it wasn't.

MR. ASHTON: Okay. I'm going to put a question I think which summarizes somewhat the dilemma this Council finds itself in and looks to you and others

for their expertise. As I would perceive it, having gone through parenthood four times and survived, there are a universe of risks or risk factors that affect our life. There are some that are politically correct I think, there are some that are potentially significant without -- I wrote down a few just to -- at random, seatbelts and airbags, car accidents is a risk that we all face, prescription drug interactions, excessive exposure to sun, obesity, lack of vaccinations, West Nile Virus, sexually transmitted disease, mercury, lead, arsenic, chromium, and all the rest of it. In the universe of risks that you worry about officially for the State, where does EMF fall --

DR. GINSBERG: Okay, that's --

MR. ASHTON: -- is it one of the prime risks we're sweating out or is it -- or where?

DR. GINSBERG: Well, we actually have a quantitative way to address that, because if the background rate of leukemia, childhood leukemia is roughly 1 in 10,000 and if you can double that rate through EMF -- and by the way, there are virtually no known causes for childhood leukemia, this is one of the few environmental signals that we're getting that could be related to childhood leukemia. So that on its own

represents something of significance that might be contributing to a very important disease, but let me -- let me get back to my quantitative. There's two quantitative ways to look at it. One is now we're adding 1 in 10,000 extra cases -- 10,000 exposed individuals, one extra case. That is well above the diminimus risk level that we -- we typically clean up waste sites in Connecticut to one in a million, so 1 in 10,000 is a hundred times more risk than what would be typically tolerated in a clean up at an industrial waste site to protect children who might end up living there in the future. I do want to caveat that and say that we have other limits that are geared towards 1 in 10 to the 5^{th}, the one in a hundred-thousand risk, that would be a little bit more liberal, but we don't have any risk limits that are this liberal, that would be 1 and 10 to the 4^{th}. So if the risk is real, and I'm not saying that there's a proven linkage here between EMF and childhood leukemia, but it's -- there's a suggestion, there's a lot of uncertainty, and if these findings do stand the test of time and are real, this does elevate itself into a risk range where action would be taken in other scenarios.

COURT REPORTER: One moment please.

(Pause). Thank you.

DR. GINSBERG: The other quantitative way to look at it is a number of these studies do a what if kind of quantitative analysis of attributable risks. In other words, out of all the childhood leukemia that we see out there, what if these odds ratios are valid, what -- how much of childhood leukemia could be attributed to living near power lines and EMF. And they've done -- they've looked at the statistics on how many homes are near sources and power lines. And the numbers are generally 3 to 10 percent of childhood leukemia would be attributable to EMF.

MR. ASHTON: Now, that -- doesn't that presume then that there is a one for one relationship out of that 1 in 10,000? In other words -- let me go back to the number which I pushed on you without malice earlier on, the hundred cases per year, in so -- and that's assuming there are a million in that age grouping --

DR. GINSBERG: Right --

MR. ASHTON: -- of up to 14, which is probably not too far from the mark -- but insofar as you are looking at this and you are indicating that there is an elevated level of concern, a possible linkage -- and we've used nebulous terms in here because we don't really

have the precise quantification to make it tighter -- what kind of influence do you think they are having on that hundred cases per year? Are we talking about one in a hundred or are we talking thirty in a hundred, or what? What -- you know, what's the relationship here because we're exposed to EMF all over the place?

DR. GINSBERG: Right. Well again the attributable risk from the epidemiology studies, there's two different studies that have looked at this, say roughly three to ten percent of all the leukemias -- childhood leukemias may be attributable to EMF sources. So if there's a hundred, for round numbers --

MR. ASHTON: You're talking three to --

DR. GINSBERG: -- three to ten --

MR. ASHTON: Okay --

DR. GINSBERG: -- statewide, as a very crude number.

MR. TAIT: Out of 10,000?

MR. ASHTON: No --

DR. GINSBERG: No, no, out of all the leukemias per year --

MR. TAIT: Out of a million --

CHAIRMAN KATZ: A hundred per year --

MR. ASHTON: Three to ten.

MR. TAIT: Three to ten.

MR. ASHTON: May --

DR. GINSBERG: Out of -- three to ten out of the hundred or so that pop up in Connecticut in a year --

MR. ASHTON: May --

DR. GINSBERG: -- perhaps --

MR. ASHTON: Perhaps --

DR. GINSBERG: -- three to ten might be attributable --

MR. TAIT: To EMF.

DR. GINSBERG: Yeah, and based upon the literature that we have to work with.

MR. ASHTON: As I think about it, there's another source of EMF that hasn't been really discussed within this hearing. And I'm thinking of -- at least not very much -- I'm thinking of substation workers who work around large power transformers which would be a source of EMF, and especially I'm thinking of workers inside of generating stations working around generators, excitors, transformers, what have you, and large motors in the plant, pump motors which are up in the multi-thousand horsepower and so forth. And I also think of workers in industry such as steel mills where the large rolling

mills have motors in the thousands of horsepower, and they may be positioned in their work role such that they are quite proximate to these motors for long periods of time. Are you aware of any studies on workers in such a case that have had any results?

DR. GINSBERG: Well, we had the conversation before with the attorney about the brain cancer evidence in electrical workers. There is some evidence -- the evidence for brain cancer really has not stood up. The NIEHS panel work group that voted on the issue of childhood leukemia, also included -- in terms of calling it a possible carcinogen, also looked at the human -- I'm sorry, the adult worker studies, and they weighed in the chronic lymphocytic leukemia, or CLL, increases that are suggested in the literature as being part of the reason of why they're calling it a possible human carcinogen. So you know, I can't go back and say whether the specific occupations -- I know that electrical linemen have been looked at. But whether, you know, some of these real high exposure situations have been evaluated -- but we have to understand also that in cancer dose response if you get too high an exposure, sometimes you don't see the effect because you could be killing the cells that you would normally be mutating and

would go off to form a cancer. So sometimes you get a lot of toxicity and you don't necessarily -- you know, people may have shorter life spans, there may be other inter-current reasons why you may not see the expected cancer effect, so --

MR. ASHTON: But is that --

DR. GINSBERG: -- and with real -- with real high exposure --

MR. ASHTON: I understand --

DR. GINSBERG: -- I would just put some caution into the thinking.

MR. ASHTON: What you're telling me, I think, is that if you get high exposure, then all cellular damage are fatal to the cell --

DR. GINSBERG: Right --

MR. ASHTON: -- as opposed to being a distribution of minor injury to total --

DR. GINSBERG: Right --

MR. ASHTON: -- total damage?

DR. GINSBERG: Right.

MR. ASHTON: Is that valid?

DR. GINSBERG: That's -- that's been shown, that if you -- if you kill that risk cell population, that you don't get an initiated clone, you

don't get the tumor process going.

MR. ASHTON: Why would EMF only cause childhood leukemia as opposed to leukemia at a later stage in life, such as a teenage leukemia? What is magic about this supposedly that stops it or I'm presuming here that doesn't carry it beyond that, because we're all generating new cells in our bodies all the time, at least most of us are --

DR. GINSBERG: The -- right, right --

MR. ASHTON: -- or I hope --

DR. GINSBERG: -- and the bone marrow is fairly -- is important in generating new cells --

MR. ASHTON: Right --

DR. GINSBERG: -- and so those cells are dividing and it represents and at risk population. However, very early in life when the infant is not depending upon, you know, the maternal system which it received at birth through cord blood for immune defenses but as its developing its defenses, which takes six months to two years, you know, for a host immunity to really develop, that there is much important cell division and cell differentiation. And so this is believed to be a sensitive period for asthma in terms of exposure to environmental agents as well as to

carcinogens. There's -- there's good evidence for -- in animal studies for increased liver cancer risk, brain cancer risk when juvenile animals are exposed, 10 times more risk than when adult animals are exposed. We don't --

MR. ASHTON: To -- to what?

MR. FITZGERALD: You're not talking about EMF?

DR. GINSBERG: No, this is to various different nitrosamines to various different carcinogens -- -

MR. ASHTON: Well, let's --

DR. GINSBERG: -- so that the general principle that's been learned from these studies is that early life stages because of high rates of cell division in important maturational events can be particularly susceptible to carcinogens and damaged DNA.

MR. ASHTON: But leukemia is a life span disease, is it not, that people get leukemia as children, they get it as adults, and they get it as old people too --

DR. GINSBERG: Right --

MR. ASHTON: -- isn't that correct?

DR. GINSBERG: Yes, probably from

different causes.

MR. ASHTON: You think that the causation is different in each case?

DR. GINSBERG: The -- the types of leukemia are very varied, from chronic to acute

MR. ASHTON: Yeah.

DR. GINSBERG: -- and different cell types are involved. And there's very little that's actually been proven about the causality, but certainly we know that certain types of leukemias mostly only develop in old age and some can develop at anytime and some are more common in children --

MR. ASHTON: Well, let me --

DR. GINSBERG: And so --

MR. ASHTON: -- let me put it this way, we've talked about early childhood leukemia and the possibility that EMF may be a causal agent. Is the type that we're referring to, without getting into the real nitty gritty medical terms, of early childhood leukemia evident also in adults --

DR. GINSBERG: Yeah --

MR. ASHTON: -- or is it a unique feature to people --

DR. GINSBERG: It's not -- it's not unique

to children, but --

MR. ASHTON: Okay. Why would that not -- if it's evident -- if EMF supposedly, supposedly is a factor in causing early childhood leukemia of type XYZ, why wouldn't it also be a factor in adult leukemia of type XYZ?

DR. GINSBERG: Because the -- there's a couple of reasons -- that's a good question -- because -- there's a couple of reasons for that, (1) it would be because of higher sensitivity in early life. And if you're saying that if somebody lived at the same address near the power line for long enough as a baby and later on -- you know, if the -- if the leukemia that was related to exposure as a baby only developed say at age 30, they would have had to have lived at that same address for those 30 years for it to show up in these epidemiology studies as related to the power line. Fortunately with EMF there's a short latent -- I'm sorry, not with EMF, but with childhood leukemia, acute lymphoblastic leukemia, ALL, there's a fairly short latency period, so that recent exposure will produce the effect and you can link -- it's more easy to link that to a certain residence because you don't have all the mobility concerns. So I think to -- the answer to your

question is it could show up -- early life exposure could show up later in life, but it would be harder to find it because those people would have moved around and you would be harder to link that to power lines --

MR. ASHTON: Well, I wasn't think so much of early life exposure as a person who might be not exposed to any EMF living out in Antarctica where there's -- or not -- up in the Yukon --

DR. GINSBERG: Yeah --

MR. ASHTON: -- where there's no electricity at all suddenly coming down and plopping themselves beneath a high voltage line as an adult, why wouldn't there be a probability of a causal effect applying to that adult insofar as you are saying there is a causal effect?

DR. GINSBERG: Well, I'm not saying there is a causal effect. I'm saying --

MR. ASHTON: Or probability of a causal --

DR. GINSBERG: -- that there is some evidence that suggests an association and there's a lot of uncertainty about safety in certain ranges of exposure.

The -- that grownup, that adult person may well have less sensitivity to the effect of the fields.

But believe me if there was good animal models for this, that would be an excellent study, to test juvenile -- you know, one-day old animals versus adult animals and see if they get the same amount of cancer from the exposure, but we don't have a good working animal model, which is where you could really test that kind of concept.

MR. ASHTON: I think I'm going to pass further at this time. I'll catch up some more. I'd like to know what -- talk about federal policy. State policy can vary all over the lot, but somehow we've got to have 50 United States out of this mess.

DR. GINSBERG: Congress asked NIEHS to research it and this was the government scientific report back to -- it was -- you know, we talked about the NIEHS document a couple of times.

CHAIRMAN KATZ: Thank you. Mr. Wilensky.

MR. WILENSKY: Going along -- just a question or two along with what Mr. Ashton was asking you about your tests on childhood leukemia. Have there been tests on adult leukemia --

DR. GINSBERG: Looking at --

MR. WILENSKY: -- because I know in your report here you talk about clusters in child -- there's no known clusters in childhood. Are there known clusters

in adults?

DR. GINSBERG: Not to my knowledge in Connecticut, no. On a national basis there have been some associations between certain chemicals and childhood and adult leukemia, trichloroethylene in Woburn, Mass., and in a town in New Jersey there have been some associations, but not with EMF in Connecticut. I mean, you know -- or with any agent in Connecticut. We just don't have the right exposures and the right data to really probe that.

MR. WILENSKY: Thank you, Madam Chairman.

CHAIRMAN KATZ: Mr. Lynch.

MR. LYNCH: One good thing about being at the end is most of the questions have been answered already. But I have one quick question, Dr. Ginsberg, and it -- you said that your office is receiving calls related to EMFs. Now are those calls directed towards the electrical industry or towards the telecommunication industry in the people's concerns?

DR. GINSBERG: Yeah -- some are both. Certainly cell phone towers is a common question that we get in the siting of those near people's homes. More -- much more prevalent are the -- sort of the real estate purchase type of question about living near these high

tension wires, and there's been hearsay or something in the media, you know, how much concern should we have over that.

MR. LYNCH: And one last question -- more of a clarification on my part not having been in a science class in the last 30 years. When you were referring to this afternoon background levels in noise, are you talking about the source of the EMF or some ambient connection to that?

DR. GINSBERG: I -- I don't know exactly when I talked about background levels in noise. Sometimes I refer to noise in terms of there's -- there may be cases that occur as part of the background rate and that may be highly -- the noise is the variability in that. So sometimes it's hard to see an effect because, you know, the numbers are bouncing around, like -- you know, like an oscilloscope, making noise, or picking up sound waves, so that to see -- if there was no variability and background was a straight line and you didn't have that kind of play in the numbers in the noise, then it would be much easier, you'd need fewer exposed people, fewer cases to see a statistical effect. When you have that noise, you need to have a higher -- typically a higher incidence level to see it above all

the noise.

MR. LYNCH: Thank you.

CHAIRMAN KATZ: Just one clarification, Dr. Ginsberg. The Health Department really doesn't care how we get down to 3 to 4 milligausses over a 24-hour average, they don't have a preference on how we get there, correct?

DR. GINSBERG: Well -- you know, I have to pause a little bit because if you were going to allow a peak exposure that was really high but it was only for brief periods of time -- and we don't really know what goes on at peak -- you know, at really high levels. There's some suggestion again from the animal literature there may be DNA strand breaks. So, I would be a little unnerved if, you know, you were going to get to that long-term average by allowing big spikes.

CHAIRMAN KATZ: Okay, thank you. Any other final Council questions of Dr. Ginsberg? You're going to be here tomorrow, Dr. Ginsberg?

DR. GINSBERG: Yeah, I'm planning to be.

CHAIRMAN KATZ: Okay. And I guess we've given you a couple of things we've asked you to follow up on --

DR. GINSBERG: Yes --

CHAIRMAN KATZ: -- and we will be doing that tomorrow. Mr. --

MR. FITZGERALD: Would you ask -- would you ask him to file a resume as well?

CHAIRMAN KATZ: I thought we did that already -- we did not?

DR. GINSBERG: I have not been asked to do that.

CHAIRMAN KATZ: Okay. Could you please do that. I think that's a fair --

DR. GINSBERG: Do you want these homework assignments by tomorrow?

CHAIRMAN KATZ: Uh -- (laughter) -- why don't we do this, why don't you tell us -- for example, the number of cancer cases --

DR. GINSBERG: Right, yeah --

CHAIRMAN KATZ: -- why don't you tell us tomorrow what you can tell us tomorrow and then we'll -- what you can't, we'll get you on cleanup day in June.

DR. GINSBERG: Okay. Well, let me just be clear, the number of childhood leukemia cases in Connecticut. And what was the --

CHAIRMAN KATZ: And Mr. Cunliffe, you had asked him to --

MR. CUNLIFFE: The material you referenced --

DR. GINSBERG: Oh, right --

MR. CUNLIFFE: -- for your 3 milligauss determination.

CHAIRMAN KATZ: And didn't we also ask for a reference --

DR. GINSBERG: I think it was -- no, the 300 feet --

CHAIRMAN KATZ: Three hundred feet --

MR. CUNLIFFE: Three hundred feet --

DR. GINSBERG: The 300 feet, that's what it was, okay.

MR. CUNLIFFE: Sorry.

DR. GINSBERG: I'll see what I can get by tomorrow.

CHAIRMAN KATZ: Okay. Was there anything else in particular that he was going to follow up --

MR. ASHTON: The resume --

CHAIRMAN KATZ: And your resume. Great, thank you, Dr. Ginsberg. We'll look forward to seeing you tomorrow.

Okay, at this point what I'd like to do is go to cross of Dr. Aaronson. And then if there's -- if

anyone has that. We'll go through the list. The Towns, Attorneys Ball, Boucher, Kohler, any further cross-examination of Dr. Aaronson?

A VOICE: No questions.

A VOICE: No questions.

CHAIRMAN KATZ: The attorneys said no questions. Assistant Attorney General Wertheimer, questions for Dr. Aaronson?

MR. WERTHEIMER: No.

CHAIRMAN KATZ: Mr. Wertheimer said no. Communities for Responsible Energy?

A VOICE: No questions.

CHAIRMAN KATZ: They said no questions. OCC, Mr. Johnson?

MR. JOHNSON: None.

CHAIRMAN KATZ: Mr. Johnson said no questions. Mr. Schaefer, questions for Dr. Aaronson?

MR. SCHAEFER: No, I don't.

CHAIRMAN KATZ: Is there any party that wishes to cross Dr. Aaronson that I did not call upon? Mr. Cunliffe, do we have anything further for Dr. Aaronson?

MR. CUNLIFFE: If there's anything that Dr. Ginsberg has mentioned that you would counter, is

there a statement you would like to make with regards to that, or if you totally agree with most of the information, then --

DR. STUART AARONSON: I have many points of disagreement with Dr. Ginsberg. I could -- I guess we would want to try to organize them in a way that would be helpful to you.

You know, in my role here, you know, I spent 25 years in the public health service of what I thought was serving my country, trying to do things that would help understand the basis of cancer, and where there were public health issues, to be able to evaluate them when they came up. To evaluate something like this, I think you really -- you have to look at literature and you have to do it objectively and you have to read the papers, and as a scientist be able to evaluate quality to the extent you can.

And I think what that Dr. Ginsberg has done here has been to cite -- for example in the case of this Lei and -- I don't have the paper in front of me now, but the Lei and Singh paper, that's one study. There are at least five or six other studies that I've looked at that I think by quality have been done better, under better controlled conditions, under conditions in

which one important variable is does the investigator know what he's looking at. They call that blind or double blind kinds of controls. The way the experiments are done. This has not been reproduced, so we don't really know whether or not somebody could go back to the same methodology that Lei and Singh used and repeat it. But what they did was they took rats they exposed for a relatively short time but at high exposure levels and then they took out their brains. Then they had to -- actually they didn't use DNA from those brains, they had to take single cells from those brains. So they have to disrupt the brain issue to put them into the gel to do this what they call comet assay. Now unless you are really careful, the brain over here that lasts -- sitting around for a period of time, may -- may do so longer than the brain that you do, you know, the next time. If you know or you don't say you've done this blinded, so that I don't know whether it's the controlled or the exposed animal to which I'm looking at, then there is the potential of bias. And I -- and the amount of effort and work to go from the beginning of the experiment to the point where they can do the analysis leaves many potential points where you would have DNA breakdown simply because cells are sitting around and not having

been treated properly.

Now if you take cells in culture, which a number of other investigators have done, and expose them to incredibly high fields, 5,000, 10,000 times what we're talking about here, those investigators using the same assays have found no effects in terms of evidence of DNA breakdown using the same type of assay. Now there were years ago over the very long-term that this problem has been under investigation, there have been lots of other tests that would give you markers of DNA damage. The evidence -- you know, you'll have a paper like this one or a series of papers like this one -- this same group found that Vitamin C causes DNA damage under the same kind of conditions. In this case I guess they fed the rat Vitamin C.

So you have to look at the totality of what's out there. And that's what I've done with a background I hope that allows me to make scientific judgment, unbiased scientific judgment. Because if I felt there were a problem, I would not be here. In other words, I wasn't chosen because I -- you know, I was going to say what they wanted, I knew what I was reading and concluded, and they therefore took me as an expert witness.

So from the standpoint of the information that you presented, I believe it was selected and it wasn't thorough. And I think that the evidence for any kind of DNA damage to cells is just not -- you know, certainly not consistent and certainly not convincing in the totality of things that I've looked at in the literature.

Now when you go -- I think we do agree on the animal toxicology data, but I just wanted since I hadn't maybe made it as clear as I would have liked to the last time, the kinds of studies that have been done now with animals are of a standard that meets essentially the tests that the National Toxicology Program utilizes for the testing of agents that they consider potentially hazardous. And this particular agent has passed with flying colors. There is no data that argues from any of a number of really well done scientific studies, even studies for example in the case of leukemia where we know that mice and rats are really not that different from humans, if we really want to understand -- in fact, if anything, they're more sensitive to cancer than humans based on the studies that I'm aware of that are experimental type of studies. Scientists have actually in the case of animals taken -- sort of given them a

predisposition to cancer, given them the first step and targeted that cancer to be a leukemia, put those animals in high intensity, much higher than we're exposed to EMF situations, no evidence of an increase in cancer risk in that situation. So we've gone through the animal data, we can do it in more detail, but my assessment as a scientist looking at this as objectively as I can, is there really isn't any evidence of risk using the kinds of studies that the National Toxicology Program uses to assess risk of these agents.

Now, I disagree one more time with Dr. Ginsberg. I mean, I am not a toxicologist. I'm a cancer biologist, but I can evaluate the literature in this area. I felt the last time when I was here that I wanted to go back and look at the National Toxicology Program and look at all of the agents that have been listed as carcinogens for man. Arsenic is one of them. And arsenic, if you just wanted to look at their website, has been tested for carcinogenicity in animals and it's a positive. And in fact, essentially all of the ones that are known to be carcinogens have been tested in animals and have been found to be positive in my quick look through their website, which I'll be happy to provide to you. So, I don't personally -- you know, we have to be

aware -- and you're in the position where you have to be doing this for the State of Connecticut, you have to -- and I -- you know, I'm very impressed with the quality of the questions here -- you know, how do we evaluate the relative priority of risks and is there any potential downside to scaring people on things that really aren't a risk for them, and I think there is, there's a balance, you know. And so there are things that really are important risks we should help the public to avoid them. And when things are tested and there really isn't evidence that there are risks, particularly at the levels that we're talking about, a thousand fold lower, then the things -- then the test conditions that have been done in toxicology studies that have proven negative, then I say, you know, as a consumer I don't see this as a major problem or even any problem.

So, I -- I've made a long answer to your question, but there really were a number of issues that I had, you know, in disagreement with Dr. Ginsberg -- maybe one last one -- when you have an agent that is causative of cancer, in my experience, something -- let's take X-ray radiation -- now obviously if you give enough radiation, X-rays to a living organism or a cell, you won't get cancer, the cell -- or the animal will be dead.

But if you do in a dose response range where you can measure, the greater the dose, the greater the level of tumors you will see. So that's another area where I have some disagreement with you.

So, I -- I'm sure I can find others, but my memory is now --

CHAIRMAN KATZ: Thank you --

DR. AARONSON: -- I've done it.

CHAIRMAN KATZ: Mr. Cunliffe, any other questions?

MR. CUNLIFFE: I just wanted to follow up because Mr. Schaefer pointed out a number of studies that looked like it had some indications you would use a precautionary principle to maybe not go down that road, and Mr. Ginsberg's position for the State of Connecticut is to do risk assessment. So, I think, you know, you would probably respect that --

DR. AARONSON: Sure --

MR. CUNLIFFE: -- and as many studies as you can point out, you wouldn't disagree with Mr. Schaefer pointing out some other studies?

DR. AARONSON: No, I think -- I think as long as we are objective, as long as we look at all of the data that's out there. The other thing that I think

has come out in the previous hearing is the quality of studies has gotten better. In other words, in the earlier days people would make a citing of something and the government, I think the power industry, or whoever put up that 40 million dollars or more to have a number of well designed studies peer reviewed and done, I think has helped to clarify this issue.

I'll make one other point that didn't come up from Dr. Ginsberg, but I did one other homework assignment, I went to the NI -- I went to what we call -- there's a crisp website that which talks about all NIH funded investigations. This came up at the beginning of the hearing when the Attorney General talked about 230 studies and you saw the panel sitting around and saying, huh, you know, we don't know what's ongoing because you know -- but we can find out that if we go to this website. Does anybody want to venture a -- I guess I shouldn't say -- how many studies are currently being funded by the NIH as I was able to find on that crisp website related to EMF health effects, not where you're using electromagnetic fields for therapeutic benefit, that's a different kind of thing, but looking at the issue that we're talking about, does anybody have any idea? I was able to find one remaining study. So that

that tells you from the scientific perspective that science has moved through this issue in my evaluation and is now moving on.

CHAIRMAN KATZ: Thank you.

MR. CUNLIFFE: Mr. Ginsberg attached to his prefiled testimony a World Health Organization website identifying as many 14 studies. Are you aware of those?

DR. AARONSON: No. And I literally only looked at the NIH funded investigations.

CHAIRMAN KATZ: Okay. Yes, Mr. Emerick.

MR. EMERICK: Yes. Dr. Aaronson, you said science has kind of moved through this issue because of the number of studies that are ongoing. But how has science moved through this issue when we have some national institutes which put it in a questionable category? How do you --

DR. AARONSON: Well --

MR. EMERICK: -- reconcile that?

DR. AARONSON: I would -- I would probably defer on this to my colleague in the epidemiology area. My understanding from my discussions is that IARC will keep a compound or an agent on the 2B list if there is any human epidemiology out there concerning it. Maybe

Dr. --

CHAIRMAN KATZ: Can we perhaps do that tomorrow then --

DR. AARONSON: Yeah --

CHAIRMAN KATZ: -- Dr. Cole, can we ask that we take that up tomorrow with you, we have some other business that we -- and you're going to be with us tomorrow, correct?

DR. COLE: I will be here and I will be glad to discuss it.

CHAIRMAN KATZ: Mr. Emerick, can you ask Dr. Cole that tomorrow?

MR. EMERICK: I guess I can.

CHAIRMAN KATZ: Okay. I just want to make sure we -- okay, does that conclude the --

MR. CUNLIFFE: I'm done, Chairman.

MR. ASHTON: I have one --

CHAIRMAN KATZ: Yes.

MR. ASHTON: In my conversation with Dr. Ginsberg, I asked if there was at high exposure a random effect on -- not a random, but a different effect on cells from complete destruction down to injury, and he -- as I understood him, and correct me, said that with high exposure you either the cell is okay or it's dead in

effect. Do you agree with that?

DR. AARONSON: I mean if we were speaking about EMF --

MR. ASHTON: Yes.

DR. AARONSON: -- the exposure levels that I've read studies about that go up as much as five to ten-thousand fold, what we're talking about in terms of human exposures from these electromagnetic fields don't show any effect.

MR. ASHTON: Okay, thank you.

CHAIRMAN KATZ: I think that concludes cross-examination of Dr. Aaronson. Does anyone have -- oh, Mr. Schaefer, yes?

MR. SCHAEFER: Yeah, I -- I have two questions of the witness that were raised by his testimony just now.

CHAIRMAN KATZ: Do you want to sit over here, Mr. --

MR. SCHAEFER: I don't need to sit -- thank you -- I guess I shouldn't ask the questions from behind -- Dr. Aaronson, do you have the -- a copy of the Lei and Singh study in front of you?

DR. AARONSON: I actually did, but I don't have it right now.

MR. SCHAEFER: Well let me give you my copy. And if -- just for ease to move this along, I circled the section with respect to discussing the blind nature of the study.

DR. AARONSON: Right.

MR. SCHAEFER: And would you -- is it true that the people that were analyzing the slides and the results from the experiment were blind as to which group they were examining the slides from, is that correct?

DR. AARONSON: To be a hundred percent clear, the people in this -- as they wrote this study who looked at the data coming from the assay, did not know whether the things they were looking at came from one type of situation versus the other. It does not say that the people that prepared the rats or the mice -- the rats for the experimental testing didn't know which they were --

MR. SCHAEFER: It doesn't say one way or the other in the description --

DR. AARONSON: It doesn't say one way or the other, but if you really want to be fair, that is an important thing to have in your methodology. In other words if I know that I'm going to say -- I mean I don't know what they did, but I would liked to have known in

this paper that the guy or woman who took those rats, chopped off their heads, put the cells in culture or whatever, you know, got them ready for the guy that was doing the thing blind, didn't know whether the animals they were dealing with were either the controls or the others because the timeframes that are involved in this processing could really be an important factor.

MR. SCHAEFER: Okay. And the other thing, you mentioned the motivation for the Applicants hiring you. They talked to you about why they wanted you to testify, didn't they?

DR. AARONSON: I think they -- I mean clearly I have in the past, as I told you, been in 1, 2, or 3 situations where I have previously provided expert testimony --

MR. SCHAEFER: Okay --

DR. AARONSON: -- but I did that only after I had reviewed literature --

MR. SCHAEFER: Right --

DR. AARONSON: -- made my own scientific decisions, and under those circumstances -- I'm sure at that point they were willing to have me --

MR. SCHAEFER: Okay, but you were paid for the effort you made --

DR. AARONSON: Absolutely --

MR. SCHAEFER: -- by the utilities to look at the issue --

DR. AARONSON: No --

MR. SCHAEFER: -- and then --

DR. AARONSON: -- no --

MR. SCHAEFER: -- when you --

MR. TAIT: Mr. Schaefer, asked and answered.

MR. SCHAEFER: Sir, you talked about your years of public service, correct? Were you reprimanded by the NIH while you were there?

DR. AARONSON: We had a situation years ago when -- in fact, this is my only experience in this area, as I told you, working on the issue of this New York Power Authority -- we had very stringent rules concerning how much work we could do for any given -- in any kind of consulting. Legal consulting wasn't among those rules. In other words, I had started a -- you know, the work involved this particular thing that I did in the court case in New York while the rules were a certain way. And then in midstream the NIH people -- again not -- no law, no anything, just simply their guidelines, they now said legal consulting was now

constrained by a certain number of hours that we could work during a year. I was put in a position that I either couldn't continue this process because this was part of what I was doing or I guess I could have worked for free. So without knowing what to do, I continued to do the legal consulting and testified in that case. One of the people on the other side of this issue, a scientist I guess in California, with me and one other NIH investigator who was in the same situation, contacted the NIH and for a period of time we were in a position where we really couldn't do any more work. We finished that particular set of responsibilities. And basically, they investigated. And I had somebody come to my office who had been with Henry Kissinger before he went to China -- or when he went to China, and that guy asked me the question well what do you -- you know, do you know about these rules. And I said I know what the rules are, but I don't know what to do when you change the rules in midstream. And that still had not been settled at the NIH. So, I don't know whether I was ever reprimanded, but I certainly was prevented during that period of time from doing any further legal consulting.

MR. SCHAEFER: You're not aware that an official reprimand was entered?

DR. AARONSON: I really don't remember that there was.

MR. SCHAEFER: Okay. And -- okay, no further questions.

COURT REPORTER: One moment please. (Pause). Thank you.

CHAIRMAN KATZ: Mr. Tait, do you want to follow up?

MR. TAIT: On that Lei and Singh study is it something that you do not think that you can rely upon in your --

DR. AARONSON: I would say in fairness to it, I would take it as part of the totality of things that I've looked at. I would treat with greater credibility, greater weighting those studies for example that really were done with cells in culture because there weren't the various treatment conditions. And remember we've done -- not we -- the United States has done whole animal studies over a lifetime of animal and seen no evidence of any adverse effects of EMF, including brain damage. So there are other studies that I've looked at where basically there is no data to say there is any effect at all of EMF in the assays that these people have used even using human cells.

MR. TAIT: So this study in no way changes your opinion?

DR. AARONSON: No. I'd read it before I had made my testimony.

MR. ASHTON: A quick one.

CHAIRMAN KATZ: A quick one, Mr. Ashton.

MR. ASHTON: Dr. Ginsberg and I had a colloquy on -- about how long studies have been going on. And I believe he said he's been -- or he thinks studies have been going on since about 1980. Do you have a different perspective on that? How long to your knowledge have studies on EMF gone on?

DR. AARONSON: I think that certainly from the mid 80's through the let's say 2000 -- 2001, 2002. So it's been a period of, you know, let's say 20 -- at least 20 -- roughly 20 years.

MR. ASHTON: Okay, so you basically agree with him?

DR. AARONSON: Yeah.

CHAIRMAN KATZ: Thank you.

DR. AARONSON: Could I ask -- make one more point? In addition --

CHAIRMAN KATZ: Quickly --

DR. AARONSON: -- to whatever this guy had

-- sorry -- the attorney had just said, I'm also the recipient of the highest honors in terms of meritorious service that the NIH gives. And got one of those two awards after this episode.

CHAIRMAN KATZ: Thank you. At this point does anyone have EMF questions for Mr. Carberry who will not be here tomorrow? Is there any party or intervenor who has EMF questions for Mr. Carberry? Okay.

At this point, what I'd like to do is take up the procedural motions. Mr. Cunliffe, what I'd like for you to do is summarize the motions that we've received from the Towns and give the staff recommendation.

MR. CUNLIFFE: We have the municipalities of Bethany, Cheshire, Durham, Easton, Fairfield, Hamden, Middlefield, Milford, North Haven, Norwalk, Orange, Wallingford, Weston, Westport, Wilton, and Woodbridge, collectively the Towns, seeking to prefile testimony by May 25th, a week later than we had set for the June 1st hearings. This is on material related to Segments 1 and 2 and to the GE modeling. They have also requested to postpone that modeling of the GE studies until a prefiling of July 7th because they've just made arrangements with the Applicant and with GE to have these

studies perform which require about a 30-day timeframe to have those completed.

Staff recommends that the prefiled date of May 25th would be appropriate as long as all the parties and intervenors are allowed to submit at that time as well, and that the July 7th is reasonable. And this would tie in with a motion by the Towns of Woodbridge and Milford who also have a study separately being done by GE. However, GE says it can't be done. And I believe that maybe we'd want to have the parties weigh in as to why all these studies can't be done simultaneously and that they meet a July 7th prefiled date.

CHAIRMAN KATZ: Thank you. Mr. Fitzgerald and Miss Randell, if you could speak to the motion.

MR. FITZGERALD: Yes. First of all, on the May -- we have no objection to the May 25th extension on the basis suggested by staff.

As to the July 7th request and the GE studies, I have to say from our own experience with GE that the estimates that are reported in that motion have the ring of veracity. We have encountered similar messages from GE ourselves.

There is one thing that might provide some cause for postponing action, which is this, I think the

reason why this lengthy period of time is required is -- it has to do with the Chinese wall that has been erected. There is a dedicated employee from GE who is not working on any of the NU stuff who is doing the studies for the Towns, and that -- so the timing is controlled by the availability of that person. Everybody else in the shop is taken up with NU requests And the question that I have when the motion came in, which I have no answer to -- we tried to find somebody at GE yesterday to ask the question -- was well if -- if the Towns were willing to allow someone who's done NU work to be assigned to this project, which would be a change in the agreement and not something that I would suggest they have to agree to, but there's been -- there were some suggestions in early negotiations that maybe they might make such an agreement if it made a significant time difference. So yesterday we tried to find that out and we don't have an answer, and we're still trying to ask the question. So --

CHAIRMAN KATZ: Might you have that answer by tomorrow?

MR. FITZGERALD: So we might have it by tomorrow, yeah. And then, you know, we can see what they -- what they want to do. But if the answer that we get back is that that won't make any difference because of

whatever other commitments GE has, or the Towns for whatever reason don't want to agree to that, I would say that I don't really have a lot of opposition to offer to their request.

CHAIRMAN KATZ: Well, the Council would like to finish the hearing process by late July. And I'm going to ask all parties and intervenors to work together to see if that can -- to have that happen. But do the Towns want to speak to the motions at this point or do you want to wait until tomorrow, Mr. Ball, when we find out what's doable?

MR. BALL: Yeah, I think that we should wait until tomorrow to see what GE has to say and let the Towns consider that. The notion of having separate employees at GE with no connection to the Applicant was an important one for us obviously for the studies that we're performing, so we would have to consider that, but we should hear back from GE and see whether they can do it.

CHAIRMAN KATZ: Okay.

MR. ASHTON: May I inquire as to the nature of these studies. Are they load flow, transient network analyzer, short-circuit --

MR. BALL: They're --

MR. ASHTON: -- stability, what?

MR. BALL: They're harmonic studies designed to --

MR. ASHTON: Harmonic studies --

MS. RANDELL: And transient --

MR. ASHTON: -- GNA studies?

MR. FITZGERALD: And transients.

MR. BALL: And transients.

MR. ASHTON: Okay.

CHAIRMAN KATZ: Is there any party or intervenor who has opposition to making the prefiled date for the June -- the early June hearings to be May 25th?

MS. RANDELL: We have no objection. We would ask that you reiterate the importance of filing on time.

CHAIRMAN KATZ: Yes. Mr. Johnson, did you want to be heard on this?

MR. JOHNSON: Yes, very briefly. The -- we support the apparent movement toward May 25th as that first date. The -- one of the reasons for that is the passage of the new law in Hartford, HB-5418, which will shortly become a public act. We are going to file testimony in this next round as OCC and we want to -- part of what we want to bring to the Council's attention

is how it will deal with the new -- you know, the massaging of the rules to this docket that the new law has created --

CHAIRMAN KATZ: So --

MR. JOHNSON: -- and the time -- and the time is helpful too.

CHAIRMAN KATZ: Well just --

MR. TAIT: (Indiscernible) -- isn't that lawyers talk and not testimony --

CHAIRMAN KATZ: You're going to tell us how we should interpret the new legislation?

MR. TAIT: -- on the new law?

MR. JOHNSON: No.

MR. TAIT: I saw testimony on that bill too and I don't understand testimony on a public act. Isn't this --

MR. JOHNSON: No, no --

MR. TAIT: -- what we have lawyers for and AG's for.

MR. JOHNSON: I'm sorry if I confused people by the way I spoke. You may recall, Mr. Tait, that you made a request of our witness that they would present -- that we would present certain, you know, thoughts and options, possibilities to the Council. We

are going to do that. That testimony will be -- has to be changed somewhat in light of the new law. That's all I'm saying.

CHAIRMAN KATZ: Understood.

MR. TAIT: Well if anybody wants to talk to us about the public act that's about to be signed I gather, they ought to address it to our attorneys and through the procedural aspects and not through testimony.

CHAIRMAN KATZ: Okay, at this point I think what we could do is we could have a motion from a Council member to make May 25th the prefiled deadline for the early June hearing.

MR. ASHTON: So moved.

MR. TAIT: Second.

CHAIRMAN KATZ: Further discussion?

COURT REPORTER: Who's making that --

CHAIRMAN KATZ: Phil --

A VOICE: Phil --

A VOICE: Phil made the motion.

MR. EMERICK: Second.

MR. ASHTON: Now we've got a double second.

CHAIRMAN KATZ: Pick somebody -- okay -- further discussion? All in favor say aye.

VOICES: Aye.

CHAIRMAN KATZ: Okay, the Council has determined that the prefiled deadline for the early June hearings is May 25th. Tomorrow we'll take up under procedural matters further into the GE modeling and how that might be accomplished. But I'm again asking parties and intervenors to work together so that we can conclude the hearing stage of this process by late July.

MR. TAIT: Have we identified the dates for July that the Council will be meeting so that we know we have a quorum and vacation schedules and witness schedules?

CHAIRMAN KATZ: Mr. Phelps.

MR. S. DEREK PHELPS: The answer is yes -- yes, Madam Chair, and yes, Mr. Tait, we are doing that very thing. We're developing --

MR. TAIT: Right now?

MR. PHELPS: Yes, we are.

MR. TAIT: Because you haven't talked to me.

MR. PHELPS: I know that. (Laughter). The quorum sheet was developed yesterday.

MR. TAIT: You better check it again.

MR. PHELPS: I respectfully request that

all Council members fill out the quorum sheet when it's passed around.

CHAIRMAN KATZ: What I'm hoping for is in the month of June we conclude all matters except GE modeling and the East Shore alternatives. And having said that, if there are other alternatives that should be explored that are not related to the GE model, I'd like to do that in June. And then take up hopefully just in a short period in July GE modeling and East Shore alternatives. Yes?

MS. RANDELL: A minor suggestion to ponder. I understand why you would want to kick the East Shore consideration to the extent that it relates to the transient, the load flow, the harmonics, but in terms of the routing issues --

CHAIRMAN KATZ: Yes.

MS. RANDELL: -- I would hope that that can stay all within June --

CHAIRMAN KATZ: Yes, I'm sorry --

MS. RANDELL: -- in an effort --

CHAIRMAN KATZ: Yes --

MS. RANDELL: -- to keep what we can in June.

CHAIRMAN KATZ: Right. You're right. On

the clarification of the routing issue, such as ecological, wetlands, etcetera, yes, I'd like to keep those, as part of the harmonics and the transients and all that good stuff, yes --

MS. RANDELL: Thank you --

CHAIRMAN KATZ: -- as opposed to reliability, then that would be taken up in July. Is there -- for that approach is there any comment why that won't work, please indicate to us now or if you have further thoughts, please indicate that tomorrow, but that's basically the game plan unless I hear otherwise. Yes, the routing issues are definitely in June.

MR. TAIT: And that includes railroad, highway --

MR. ASHTON: The whole nine yards --

MR. TAIT: -- if there's going to be any more testimony, that's got to be prefiled --

CHAIRMAN KATZ: Wilbur Cross --

MS. RANDELL: Yes --

MR. TAIT: -- before the June hearing. That's your last --

MS. RANDELL: That was our understanding.

MR. TAIT: That's your last chance to get anything substantive on the record on the routing issue.

A VOICE: (Indiscernible) -- tomorrow?

CHAIRMAN KATZ: Oh, yes, we are starting at -- 10:30 tomorrow, Mr. Phelps?

MR. PHELPS: Yes, Madam Chair.

CHAIRMAN KATZ: Yes, 10:30 tomorrow.

MR. TAIT: An 8:15 conference.

CHAIRMAN KATZ: Hmm?

MR. TAIT: An 8:15 attorneys conference?

A VOICE: No, you have a subcommittee meeting --

CHAIRMAN KATZ: No, 10:15.

MR. TAIT: I'm sorry, 10:15.

CHAIRMAN KATZ: A 10:15 a prehearing conference. Okay, at this point, Mr. Schaefer, I'm going to give you either the opportunity to continue your cross now or the opportunity for tomorrow morning? Where's Mr. Schaefer? Oh --

MR. SCHAEFER: I think it would be better if I continued in the morning -- (indiscernible) --

COURT REPORTER: I didn't hear what he said.

CHAIRMAN KATZ: Mr. Schaefer indicated he would like to continue tomorrow morning.

Is there any other procedural business

that we need to do today? We are adjourned until 10:30 tomorrow morning.

(Whereupon, the hearing adjourned at 4:15 p.m.)

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CERTIFICATE

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