STATE OF WISCONSIN
CIRCUIT COURT COUNTY OF PEPIN

POESCHEL HIDDEN VALLEY, LLC,
POESCHEL BROTHERS, LLC,
ROLLIN' RIDGES, INC.,
JR FAMILY REALTY, LLC,
RONALD E. POESCHEL and JANE M. POESCHEL,
Plaintiffs,
-vs- IND #2018CV000027
NORTHERN STATES POWER COMPANY,
d/b/a XCEL ENERGY,

Defendants.

Deposition of DANIEL ANESHANSLEY, Ph.D., held at the offices of PRECISION REPORTERS, LLC, Syracuse, New York, on August 13, 2021, before PAMELA PALOMEQUE, RPR, CRR, and Notary Public in and for the State of New York.

APPEARANCES:

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Also Present: (By Videoconference)
RONALD E. POESCHEL

* * *

EXAMINATIONS

* * *

EXHIBITS

* * *

REQUESTS

1.Page 57, Line 15:

Q. Was there -- when you did these, you know, studies -- I mean training sessions, did you have handouts for that?

A. We had a booklet that went along with it.

Q. I'm going to ask you to look.

A. There was a workbook. I can go see if I can dig that out from someplace if you'd like.

Q. I'd like to do that and see, also, if you have the methodology or the protocol that you used for your testing and if you can locate those.

* * *

(Exhibit 619, Curriculum Vitae of Daniel J. Aneshansley marked for identification, this date.)

(Exhibit 620, Summary of Opinions in Poeschel v NSP Case, Daniel J. Aneshansley, PhD, marked for identification, this date.)

(Exhibit 621, Effects of Neutral -- marked for identification, this date.)

D A N I E L A N E S H A N S L E Y, Ph.D., having been called as a witness, being duly sworn by the notary public present, testified as follows:

EXAMINATION BY MR. BIRD:

Q. Good morning.

A. Good morning.

Q. My name is Charlie Bird. I'm an attorney for the Plaintiffs in this case. I'm here to ask you some questions today about your opinions as a proffered expert. You understand that's why we're here?

A. I understand that's why we're here.

Q. And the subject matter is stray voltage of which you've written quite a bit in the past?

A. Yes.

Q. What we've done, Dr. Aneshansley -- first of all, let me ask -- just tell you a couple things that

I'm sure the attorney has told you, but let me finish my question before you start your answer because the Court Reporter has to get down everything and two people talking at the same time, it's difficult.

On the other hand, and if I step on an answer of yours, you let me know and I'll let you finish; okay?

A. Okay.

Q. It's important that you answer out loud, especially because we have masks on and nodding and shaking the heads and ah-ha and uh-uh are things that don't come through very clear.

The third thing is if you don't understand any question that I ask you, you can ask me to repeat it or rephrase it. It's important to me that you and I are tracking and that we're understanding what I'm asking you and I'm understanding what you're answering.

To the extent I use technical phrases that have importance to you in your line of work, professional work, I would like to have you use your own understanding of those words and phrases; okay?

A. Okay.

Q. And if you're asking me for definitions, I'm going to probably come back to you and just say: What's your definition? Because I want to use your definition; okay?

A. All right.
Q. So the first thing we did here today was to mark as an exhibit your curriculum vitae?
A. Mm-hmm.
Q. And so I just wanted to ask you some questions about that.
A. Sure.
Q. I'm not going to belabor it a lot but -- let me see here. Okay, so, first of all, it looks like you graduated from University of Cincinnati in '65. If I did my arithmetic correct, you're 78 or just a little bit older or what?
A. I'm 78. I was born in 1942.
Q. Okay. And so you'll be 79 what, shortly here?
A. In November. November 24th.
Q. And is it okay if I call you Dr. Aneshansley?
A. You can call me Dan if you'd like.
Q. Dan. Well --
A. Or Dr. Aneshansley if you prefer.
Q. I see you have a cane for walking; is that true?
A. Well, I did that on the streets here, under repair, what have you. It's not instability. It lets me go faster.

Q. Do you have any other health conditions that you think might interfere with your ability to give truthful testimony today?

A. I don't believe so.

Q. You're not taking any medications that would --

A. I'm taking medications for hypertension and --

Q. Yeah, so am I.

A. -- other things but I don't think those have any effect on my ability to answer questions truthfully.

Q. Okay, good. So your CV says you're an Emeritus Professor in the Department of Biological and Environmental Engineering as of 2018.

A. That's correct.

Q. Does that mean that you stopped working at that time?

A. That means I retired -- I officially retired.

Q. "Officially retired" means you don't work at Cornell?

A. I do not spend a regulated time at Cornell at this point.

Q. You're not teaching classes?

A. I'm not doing anything, particularly over

the past three years since I retired. It's been a lot of other things take up my time at this point.

Q. Sure, I understand. Grandkids and all that I suppose?

A. My wife's had some serious health problems.

Q. I'm sorry to hear that.

A. That requires a lot of effort so --

Q. It looks like you became Chair of the department in, what was it, 2008?

A. Somewhere in there, yes. I could go back and look, it's on here.

Q. It seems like a lot of your teaching duties sort of went down when you became Chair. I assume you had more administrative responsibilities?

A. My teaching -- I still taught one course. I always taught a course in biological instrumentation.

Q. You continued with that up to 2018?

A. Yes.

Q. You're not teaching any courses at all now?

A. No.

Q. Now, it indicates at the bottom of the first page, if you take a look, that you've been an expert witness and consultant in the area of stray voltage 1991- and which means that at least at the time you wrote this, it was ongoing?

A. It continues. Yes.
Q. Is it still ongoing?
A. I'm here.
Q. Okay. How many times have you testified either in deposition or at trial in a stray voltage case?
A. I don't know. Probably two or three cases I've done at a trial. I was deposed maybe six or seven times, given testimony at state hearings.
Q. Right. One of them being the Public Service Commission of Wisconsin?
A. Yes.
Q. You testified twice?
A. I believe that's correct, yes.
Q. Once for Docket 106 and once for Docket 115?
A. It's been a long time ago.
Q. Sure. You recall testifying?
A. Yes.
Q. I think with Docket 106 you and --
A. Dr. Gorewit.
Q. Yeah, Dr. Gorewit, were called as a pair; I guess both of you were on the witness stand at the same time and they were asking you questions. Do you recall that?
A. That's correct, yes.

Q. And you were under oath?
A. Yes.
Q. And so you had been sworn to tell the truth just as you were today?
A. Yes.
Q. Do you believe you gave truthful testimony at that time?
A. Absolutely.
Q. Now, that testimony was, as I recall, in 19 -- was it 1988? Is that when it was, April of '88? You don't recall?
A. I don't recall exactly. I don't know if I got a date on here or not. I don't recall the exact date.
Q. The point is that you testified before the Public Service Commission of Wisconsin before Docket 106 was adopted in Wisconsin?
A. I believe we testified for information for that docket.
Q. Right, and so you understood that the Commission there was looking for your input and in terms of what would be the protocols and standards, if you will, that would be adopted in the State of Wisconsin with respect to exposure of animals to current and voltage?

A. I don't know that we were given those -- that whole scenario of what they were going to do with it. They were interested in what we had done with stray voltage and that's why we were there.

Q. I certainly understood that you and Dr. Gorewit, being really Ph.D. level individuals who had studied and published a lot in the area of stray voltage up to that time, correct?

A. Dr. Gorewit had been involved with it for a lot longer time than I have.

Q. But they were looking to the two of you to -- as sort of some of the most knowledgeable people in the country to provide them with input on the questions they had?

A. We had some publications with respect to stray voltage and I think that's pretty much what we went through with the docket.

Q. You testified about some of those publications?

A. Yes.

Q. Particularly you testified about the water bowl testing that you did?

A. Yes.

Q. That's that 49-day test?

A. Yep.

Q. One with two weeks before, three weeks of treatment, and two weeks after?

A. Correct.

Q. Then you had not yet performed at that point in time the full lactation studies?

A. I think that's correct, yes.

Q. That took place in the following --

A. That took place over about a two-year plus period.

Q. And then for the water bowl testing, you published two papers with ASAE, one being 87-3034?

A. I don't keep those numbers on the top of my head.

Q. Well, do you recall doing two papers and the other one was 87-3035? I'll just tell you the one had to do with the milking performance generally and water consumption, and the other one had to do with health effects?

A. Yes, I think that's correct, yes.

Q. Those two papers were the same dataset, same experiment?

A. Same experiment but different sets of data.

Q. And then that was followed up with a Journal of Dairy Science article --

A. Yes.

Q. -- in 1989?
A. It was followed up by, certainly by the Journal of Dairy Science article. I don't know what the date of that was. If that's important, I can look.
Q. Sure. You don't need to look. I'll show it to you later.
A. Okay.
Q. So and then the full lactation studies were also done.
A. There was two ASAE papers and that was followed up by two Journal of Dairy Science papers. That's correct.
Q. All right. So I see you belong to the ASAE, correct?
A. Yes. ASAE is now the ASABE I think, changed its name from the Association of Agricultural Engineers to include biology under it, biological end of it.
Q. At the time it was American Society --
A. Of Agricultural.
Q. -- of Agricultural Engineers?
A. Yes.
Q. Now, the name has been changed to the American Society of Agricultural and Biological Engineers?
A. Yes. I believe that's correct.

Q. Same organization?
A. Same organization, just shifting what their direction was I think.
Q. The two ASAE papers were published when that was the name. Those are not peer-reviewed?
A. That's correct.
Q. The Journal of Dairy Science papers are peer-reviewed?
A. That's correct.
Q. It says here on page 2 of your CV that you've been a reviewer for the Journal of Animal Sciences.
A. I may have reviewed one or two papers for them.
Q. Were any of those related to stray voltage?
A. I don't recall.
Q. You also reviewed for ASAE?
A. Over a wide variety of subjects from -- I don't know that I ever reviewed a stray voltage paper.
Q. You don't recall doing that for any journal?
A. For any journal right off.
Q. Have you met --
A. To the best of my knowledge.
Q. Have you met Professor Reinemann at the University of Wisconsin?
A. Yes.

Q. Where did you meet him?
A. He was a student at Cornell, graduate student.
Q. So was he one of your students?
A. He was not one of my students.
Q. Is that when you first met him though?
A. At Cornell, when he was a graduate student. Yeah, that's the first time I knew of him. He was a student under Michael Timmons, as I recall, Professor.
Q. How did you meet him? Just casually?
A. Probably just casually. I don't think I had him in any classes.
Q. Okay. And then you went to Wisconsin. Did you ever run into him after that?
A. I've run into him a number of times over the stray voltage issue.
Q. At various conferences and things?
A. Yeah.
Q. Like, I know you both spoke at the Camp Hill, Pennsylvania meeting in 2003?
A. Yes, I think that's correct.
Q. Where you published a summary of the Cornell research?
A. Yeah.
Q. You spoke about the Cornell research?

A. Okay. I don't recall that right off but I -- I'm sure that happened, yeah.
Q. It's in your CV.
A. Yeah.
Q. That's why I pointed it out.
A. Yeah.
Q. So it looks like at retirement you had -- in 2018, did you resign then?
A. No, I didn't -- I wasn't required to resign. I was required to retire. I don't know that I -- and I applied for what's called the Emeritus Professorship, and so then I was awarded that, which simply gives me some possibilities to work with students after I retire.
Q. I just wanted to -- if you could turn to page 4 of your CV, please.
A. Mm-hmm.
Q. I just want to -- the way you've laid this out in terms of publications, the first thing is books or chapters, and item 2 there references chapter 3 of USDA Handbook 696?
A. That's correct.
Q. And so were you an author of Chapter 3?
A. Together with Dr. Gorewit.
Q. So in terms of Chapter 3 -- we'll get to this, but I think you will have an opinion here that

that represents current thinking and that you stand by the things that are written in Chapter 3 today?

A. Yes.

Q. Okay. And then the second item there that's of interest is item 7 where you did some stray voltage research and that was not new research, right?

A. No.

Q. That was just a summary of past research?

A. Yeah, that -- the NRAES, I don't know if I can tell you what -- it's Northeast Regional Agricultural Extension Service, but I'm not sure that's what it is. Basically a publication for -- that provides information to a wide variety of people.

Q. That's what you presented at Camp Hill, Pennsylvania?

A. That could be where that was presented. That's from 2003, yeah.

Q. Okay.

A. I can't verify the -- I don't remember where it was presented right off.

Q. Actually I think it is in here somewhere.

A. The publication will tell you where it was published from but I --

Q. Then there's refereed publications. By that, you mean peer-reviewed, right?

A. Yes.

Q. Going through this, if we can turn to page 6, it looks like there's three refereed articles having to do with stray voltage that you either wrote or co-wrote; would that be true?

A. Yeah.

Q. That would be 25, 31 and 32?

A. 25, yeah, 31, 32, 33. Those were all in the Journal of Dairy Science, all with Dr. Gorewit and others?

Q. I missed 33. You haven't done any -- you haven't published anything peer-reviewed related to stray voltage since 1992; is that true?

A. That could be true, yes.

Q. Do you know of anything?

A. I don't -- I think that's correct.

Q. I see you have one article, page 8, and that would be item 64 there, which has to do with magnetic fields but not stray voltage?

A. That's correct.

Q. Okay. Then if we could turn to the Invited Technical Papers at the bottom of page 8, it looks like you have four invited technical papers related to stray voltage, and that's item 4, item 8, item 10, and item 12?

A. Mm-hmm.
Q. Now, which of these, if any, involved new research as opposed to simply writing an article on previously conducted research?
A. I think most of this was -- I don't know. I'd have to go back and look at them.
Q. Well, looking at them now --
A. '89 -- let's see. '89, probably not. What were the other ones? '91. 2003 might have had some stuff that we did that was published in the articles, that we did at ASAE.
Q. Right. But, I mean, we already talked about that.
A. Yeah.
Q. That was a summary of previous research and so that 2003 is the same as the --
A. We had some -- we were doing some minor things. Let me go back and look at the time on that.
Q. What I'm trying to say is that item 7 on page 4 publication is the same as item 16 on page 9?
A. Say that again, please?
Q. Item 7 on page 4 --
A. Okay.
Q. -- is the same item as item 16 on page 9.
A. I think one of those was a publication. The

other one -- which item on page 9?

Q. I'm looking at the ISBN number.

A. Yeah, those are identical but --

Q. All right.

A. I think we gave a presentation as well as wrote a paper.

Q. Correct. You wrote something but also you gave an oral presentation?

A. Yeah.

Q. And we'll get to that. Do you recall if Bodman from Nebraska was there at that meeting and asked some questions?

A. I know who Gerry Bodman is. I don't remember the details of that. He may have.

Q. Well, apparently you had made some comment that on one of the tests at 4 volts, the production actually went up.

A. That could be what the data showed.

Q. So he was asking, well, are you trying to tell dairy farmers to electrify their farm so their milk production goes up? And you said, no, that's probably not a good idea; correct?

A. That sounds like an answer I would have given.

Q. That would have been the truthful answer?

A. I was certainly not advocating -- I never have advocated 4 volts as a level.

Q. So you haven't had any technical papers other than this last summary since 1991?

A. Peer-reviewed?

Q. No, you're calling them -- you created the category. I'm on this category of Invited Technical Papers (Nonrefereed).

A. Yeah.

Q. I think you must have had in your mind what that meant.

A. That generally means that somebody invited us to give the paper and probably -- invited papers generally can be new things and they can be a review of things you've done in the past. That's that category.

Q. We've gone through, again on page 9, items 4, 8, 10, 12 and 16, and you haven't identified any of those as involving new research or new experiments?

A. Give them to me again. I can't keep track of all the numbers you're throwing at me.

Q. I'm sorry.

A. Looking on page what?

Q. Page 9, sir.

A. Too many pages in this thing. Page 9. Okay. A lot of stuff.

Q. Page 9 and I'm referring to items 4 --
A. 4.
Q. 8.
A. Let me go back and see what the category we're talking about is. This is invited papers?
Q. Correct.
A. Got you. 4.
Q. 8.
A. 8.
Q. 10 and 12.
A. And the question was?
Q. None of those involved new experiments? Instead they were reporting on other experiments for which you already had knowledge? You were putting things together in a report, if you will?
A. I don't know whether that's entirely true. There's some things -- we worked on a variety of things; the instrumentation, the monitoring stray voltage. We might have had some things that weren't in the other things that we talked about.
Q. That would relate to item 12?
A. Item 12. We had formed a group in New York State and we did training, and some of this may have been about that. I'd have to go back and look at the paper. Roger Pellerin would have been involved in

that.

Q. Okay.

A. Guidelines on Stray Voltage on Dairy Farms was probably pretty much a review of the stuff that we've done.

Q. That's item 10?

A. 10. Item 8 would be a review of recent research in stray voltage. I don't think we would have provided anything new in that view of what -- of stray voltage, but I could go back and look at that in detail. And then the other one was 4?

Q. Right.

A. That's -- again, I don't think there's anything new in that from other things that we published.

Q. Again, I want to go to the next category which is Non-Refereed Technical Publications?

A. Mm-hmm.

Q. And you can turn to page 10.

A. Mm-hmm.

Q. I think we've talked about some of these but if you can go to item 6, 7, and 8.

A. Okay. That was an ASAE paper.

Q. 3032?

A. Yeah.

Q. 3034?
A. Yeah.
Q. And 3035, okay? And item 7 and 8 were part of the same experiment, correct?
A. Yeah. 3035 was part of what went into the peer-reviewed article and we've already talked about that.
Q. We've already talked about that.
A. And the Behavior, Production, Water Intake is part of what was a peer-reviewed science paper, and the Ludington one, Dave looked at a whole variety of neutral currents in barns and we were part of that.
Q. Okay. But to just --
A. That was probably new information.
Q. 7 and 8, just so I can crystalize this, which is 87-3034 and 87-3035, ASAE, is the same experiment as shown on page 6 -- page 6, item 25?
A. I think that's correct, page 6, item 25.
Q. Right up at the top?
A. Yeah, I saw it. I want to go back and see what -- yeah, it was. Typically we would report in these papers and then put them together for publication and peer review.
Q. I just want to get a yes to my question, that's all.

A. Okay. And the yes is whether --
Q. Whether 7 and 8 on 10 --
A. 7 and 8, the Effects of Neutral-to-Earth Voltage on Behavior Production and Water Intake in dairy cattle and 8 is Effects of Neutral-to-Earth Voltage on Animal Health and Reproduction in Cattle, and those occur in -- those occurred in animal science publications. Effects of voltages on cows, that's a complete lactation.
Q. No.
A. No, that's not the one.
Q. Item 25?
A. Yeah, it says 25. Yeah, that was part of it.
Q. It's Journal of Dairy Science.
A. Yeah.
Q. 72:2184 --
A. Yeah.
Q. -- to 2192.
A. Yeah, that's correct.
Q. And so just to be clear, 25 on page 6, the Journal of Dairy Science article is the same experiment as item 7 and 8 which you -- the title to which you read on the record on page 10?
A. 25 is the Effects on Lactating Holsteins.

Yeah, '89 would have been one of those. There's also a health and reproduction of cattle.

Q. But there's not two articles for that. There's two articles for the full lactation but not for that one. Are we in agreement there?

A. I don't know. I'm trying to remember and figure out what -- all right. Let me go back here. So 7 was Effects on Neutral-to-Earth Voltage on Behavior, Production and Water Intake. 8 was on Animal Health and Reproduction, and 25 is Effects on -- we're not talking about 25, are we?

Q. Yeah, we are.

A. 25 is AC Voltage Effects on Lactating Holsteins. Yeah, that --

Q. Does it help you to look at those?

A. Yeah, it would help to look at that. Give me 25 -- if you've got 25, I can look at that and tell whether with that's what we did with those two articles and it probably is.

Q. Yeah, let me just get through your CV and then I'll go back to that.

A. Yeah.

Q. Seems like we're having trouble on those two.

A. Well, I just don't know what we had in all of that. These two articles are on health and I don't

recall what was in that paper exactly. It might have been more or less. It might have been the combination of those two or just one of the two. I just don't remember. I'd have to look at them to answer that question.

Q. All right. On page 10 again and, again, we're on the category of Non-Refereed Technical Publications?

A. Sure.

Q. You talk about 6, 7, 8. There's two more -- let's see, seven more articles on that page that have to do with stray voltage and those would be items 10 and 11, 14, 15, 16, 17 and 18; is that true?

A. I'm looking. 10 is the Effects of Discontinuous Voltages on water. 11 is Modified Drinking Behavior Due to AC Voltages on Water. 12 is not what we're looking at.

Q. Well, it's a summary of the USDA Handbook. Not 12. 12 doesn't have anything to do with it. I'm talking about 14.

A. 14 was the Summary of the USDA Handbook. 15 was a report on full lactations, and 16 was a report on the full lactations. Okay. Yes, and we did a sensitivity report and that was 1990.

Q. 18?

A. And 18 was Complex Impedances.
Q. Okay.
A. Okay?
Q. So after that -- and that -- up to there, up to 18, other than, of course, the summary of the Red Book, which is item 14, that was all based upon experiments, new research, if you will?
A. Yeah. Yes.
Q. Correct? After that time you didn't conduct any new research, did you?
MS. MERCER-LAWSON: Object to the form, vague.
Q. Let's move to -- let me move to 12.
A. We did 9 -- 95 we did Holstein Cow Impedance Muzzle.
Q. Was that an experiment?
A. Yeah.
Q. It was new research; okay.
A. Yeah. In '90 we did some experiments of Measuring Short Duration Animal Contacts Voltages and Currents.
Q. That was '96?
A. That was in '96 with Stringfellow.
Q. 53, would that be new research?
A. On 53 was the new research.

Q. Okay. And what about 54 on the next page?
A. That would have been new research.
Q. Okay. 55?
A. Yes.
Q. Is that new research?
A. Yes.
Q. That wasn't a summary of --
A. No, that's not a summary.
Q. Okay. And then 59?
A. 59. Let's see, Effects of Steady State Voltage on Mastitis. That might have been a review, and 60 was new research, 1999, and I think that's the last of it.
Q. Okay. If you can turn to page 14.
A. Mm-hmm.
Q. Under the category of Reports.
A. Mm-hmm.
Q. And item 3 there, you did a stray voltage -- some kind of a publication research report, 85-39?
A. It's a report that we did -- is that '92? That would have been a report through Empire State Electric Energy Corporation who funded some of the research that we did.
Q. What is that outfit? Is that a utility?
A. The Empire State Electric Energy Research

Corporation was an agency that was funded by, as I recall, by fines that the State had put onto the electric utilities for violations that they had incurred.

I don't know exactly how that all worked but it was -- that's how the fines went to that, and they had an organization which funded researched, but it would have funded research that was related to electric energy.

Q. So is this referred to -- I'm seeing these letters, ESEERC. Is that --

A. ESEERC is that organization.

Q. Okay. So that's an acronym that was picked up?

A. Yeah.

Q. Okay. The abstract -- it looks like you've done a number of abstracts?

A. Yeah.

Q. But the last that you did was item 7 on page 15 in terms of an abstract?

A. Yeah, I think that's true.

Q. But that was magnetic fields, not stray voltage?

A. That's correct.

Q. And the last one that actually has to do with

stray voltage would be item 5 there on page 12 -- on page 15?

A. Yes. That was called an abstract.

Q. Then if you want to turn to the last page, it lists the testimonies that you gave?

A. Yes.

Q. And you testified four times, twice before the Public Service Commission of Wisconsin, correct?

A. That's correct.

Q. And twice for the Public Service Commission of Michigan?

A. That's correct.

Q. And the Docket 106 had to do with determining an action level, correct, animal contact voltages?

A. Yes.

Q. And then Docket 115, which was in 1993, it was determining an action level for animal contact voltages?

A. Yes.

Q. So what happened between '89 and 1993 was the Red Book, correct?

A. The Red Book was published in 1990 I think. Let me look.

Q. It says December of '91.

A. Yeah.

Q. It's on page 4 of your CV.
A. Okay. Page 91.
Q. December of '91 is what I said.
A. So that would have been before '93.
Q. Correct. So did you understand that the Public Service Commission of Wisconsin was coming back to reevaluate the standards that had been adopted in Docket 106 in lieu of the Red Book, what had been the conclusions or the consensus of the authors of the Red Book?
MS. MERCER-LAWSON: Object to the form. Ambiguous, vague.
A. I don't know why they were coming back and I don't know if -- it seems to me there were a lot of people that were giving testimony to the Wisconsin Public Service Commission other than from exactly the Red Book.
Q. Okay. Now I want to turn to -- you have it in front of you but, it's Exhibit 620, and that is what we received from the defense law firm as being a summary of your opinions in this case.
A. It looks correct.
Q. Okay. So we -- I was told last night, after I arrived here, that a bunch of new documents came that were inadvertently not provided to us and I, frankly,

you know, haven't had any chance to even look at those, so I just wanted to make a record of that; that I haven't had a chance to look at them.

Do you know what those are?

MS. MERCER-LAWSON: I need to make a note to the record as well. What was produced last night was not anything new. It was inadvertently omitted from the file. Dr. Aneshansley had a thumb drive that we had forgotten was part of his file, and it consisted of a couple of items from Mr. Neubauer that you've already seen.

A. Is that what we're talking about, the two thumb drives?

Q. I don't know what we're talking about. I don't know when you got them. Did you get two thumb drives?

A. I got two thumb drives. I got a thumb drive back in 19 -- 2019 and I got a thumb drive in terms of preparation for the deposition probably within the past two weeks. I don't remember exactly when I got them.

Q. Okay. When you say within the last two weeks, you mean like yesterday?

A. No. I got them -- I got it at least ten days ago. I could go back and look. I've been working

on it for the past week and a half. I've been reading what's in it in the past week and --

Q. That new information. Let me see if I can say what it is.

MS. MERCER-LAWSON: For the record, what he's talking about with the second thumb drive is the file that was produced to counsel ten days before this deposition.

MR. BIRD: How do you know what he's talking about? Are you just telling him? That's what -- I'm confused.

MS. MERCER-LAWSON: That's what he's telling you.

MR. BIRD: He's saying that he reviewed -- I don't know what you're talking about.

MS. MERCER-LAWSON: I'm objecting to your characterization that it was new information. Nothing was new.

Q. So I have here the files that were produced yesterday or at least a list of them and I'll just read them into the record: Agrivolt Report regarding Poeschel Hidden Valley, October 2012. Did you look at that?

A. I scanned through that. Whose report was

that?

Q. Neubauer April 2016 Testing Binder and that's something close to 450 pages. Did you look at that?

A. I looked -- I went through and looked at a number of the recordings that were there that I couldn't make much sense of.

Q. Okay. And then Loud technical report with Power Quality Analysis from April 12th, 2017?

A. Yes.

Q. Did you look at it?

A. I briefly scanned through that.

Q. Neubauer Testing Report, May of 2018, which contained approximately 800 pages. Did you look at that?

A. I, again, looked at some of the recordings. They were mostly just images of oscilloscopes.

Q. And then there's Neubauer Testing Report, May of 2018, Book 2, which was approximately 180 pages. Did you look at that?

A. I looked at all of those things that are -- if that's a list of things that were on the thumb drive, I reviewed all the items on the thumb drive in some fashion.

Q. Okay. I'm just trying to get it in the record what you got here.

A. I understand.
Q. And you're talking about the thumb drive you got within the last two weeks?
A. I'm talking about the thumb drive I got within the last two weeks.
Q. And then the next item is a July 10, 2019 Neubauer Voltage Regulators Data Binder and that is approximately 450 pages. Did you look at that?
A. I looked at all of them but not in great detail. And I scanned through more than 50 of the images that were in most of those.
Q. Well, so far -- I mean, as we've gone through this, I don't see any of this as having any bearing on the fundamental opinions you have, where you're defending the Red Book.
A. Nor do I.
Q. Okay. And so at least the stuff that I've listed so far doesn't play a role one way or another in your opinions?
A. That's correct.
Q. You just looked at it.
A. I looked at it.
Q. Would that hold true for everything on that second thumb drive that you got?
A. I'd have to -- I would need a list to --

Q. You want me to read the rest of them?
A. Let me think. I don't know that --
Q. Would you prefer I finish the list?
A. Sure. Go ahead and finish the list.
Q. Because we can cut it short. Plaintiff's Second Supplemental Answers to NSP's First Set of Interrogatories, fully executed. Do you remember that?
A. Whose interrogatories?
Q. Plaintiff's Second Supplemental Answers to NSP's First Set of Interrogatories, fully executed.
A. Yes.
Q. Do you recall getting it or looking at it?
A. I looked at all the things on there. I don't remember the titles of them but there were probably 20 items or so that were on the thumb drive.
Q. All right. I'm just -- again, I just want to make sure that none of these have really much to do, if anything, with your fundamental opinion, which is the defense of the Red Book?
A. That's correct.
Q. So Annotated Diagrams and Photos Prepared by Neubauer IDing Test Locations, and that would have been something like 40 pages. Do you remember looking at that?
A. I looked at all of them.

Q. Well, why don't I read them all into the record. The next one, the BINDER, Plaintiff's Second Supplemental Answers to NSP's Interrogatories.

Then the June 12, 2019 Testing Reports of Neubauer and Lopez, which was a little over 1,000, probably about 1,200 pages.

Plaintiff's Second Supplemental Answers to NSP Interrogatories. So that's the list of everything that was produced to us yesterday that --

A. The second thumb drive --

Q. That would be on that thumb drive, right?

A. The second thumb drive had a number of papers on it.

Q. What do you mean, "papers"?

A. Papers, publications.

Q. Papers that you wrote?

A. A couple of them were papers I wrote. We talked about them. Some of them, Norell was on there, the -- it was a review of some of the publications that were used in the Red Book.

Q. I see. Okay.

A. I'm not recognizing some of the stuff you're talking about as being on the thumb drive that I had, the second thumb drive that I have.

Q. The second thumb drive --

A. Is that the first thumb drive or the second thumb drive?

Q. That's what I'm trying to figure out because what you're telling me -- because the papers that were previously disclosed, and if you just got those recently to look at, and that was stuff that I had as part of the disclosure ten days ago.

A. Yes.

MR. BIRD: You think that's correct, Counsel?

MS. MERCER-LAWSON: I do.

Q. So what you're describing is that the old thumb drive apparently was inadvertently the one that you had, you know, a year or so ago?

A. Yeah.

Q. That's the one you forgot about that you had.

A. How did I forget about it?

Q. Well, apparently somebody forgot about it because I didn't get it and you must have, you know, misplaced it or something and realized --

A. I had it all along. I guess I wasn't aware that it was my responsibility to provide that.

Q. Right. I wouldn't think it would be either but for whatever -- for what it's worth, I don't know what the dialogue was.

A. I didn't spend a lot of time on that first thumb drive.

Q. Okay. So let's go to the other stuff that I do have -- I did have ten days ago, because I think some of that also is like why would they even have you look at it because it doesn't really relate to your opinion.

MS. MERCER-LAWSON: Objection to the form, calls for a legal conclusion. Keep going.

Q. One would be the transcript and exhibits of Ron Poeschel's deposition. I take it you might have looked at that?

A. Yeah, I read through that.

Q. That doesn't make any difference to you in terms of your opinion?

A. In terms of the Red Book, no.

Q. And I'm looking at your opinion and it's two things: Defense of the Red Book and then Neubauer's methodology.

A. My concerns about that.

Q. But the depositions of the two Plaintiffs, Ron and Jane, really --

A. Have nothing to do with the Red Book.

Q. Same thing with Mark Cook deposition? That doesn't play any role in forming your opinions?

A. No.

MS. MERCER-LAWSON: Object to the form.

Q. And the human sensitivity testing that there were some videos there, that doesn't play any role in your opinions?

A. No, it does not.

Q. Okay. And then there were, in some papers, one was a Craine 1970, of course the Gorewit and you, the AC voltage in water bowls which we talked about. There's Whittlestone article from 1975. There's effects of any V on behavior, production, and water, which I think was your -- something you participated in. There's a Lefcourt 1982?

A. Mm-hmm.

Q. Behavioral Responses, Norell 1983 --

A. Yeah.

Q. -- you're familiar with that? Henke Drenkard, in '85?

A. Yeah.

Q. Lefcourt in 1985?

A. Yeah.

Q. Aneshansley-Gorewit, Effects on AV and Behavior, which we talked about. Gorewit and Aneshansley, Delays in Drinking. Gorewit and Aneshansley, Effects N-to-E V on Animal Health.

Those would all be things that would provide some basis for your fundamental opinion on the continuing validity of the Red Book, correct?

A. Yes.

Q. Those reports?

A. Those were reviewed in the Red Book.

Q. Right, and are part of the bibliography?

A. Yes.

Q. Then let's see, there's Lawrence Neubauer Responses to Hooper, 5/7/21. I take it that doesn't make your opinions one way or the other either as to the validity of the Red Book or your concerns with Neubauer's methodology?

A. That's correct.

Q. The same holds true with Neubauer Responses to Hooper, item number 5 there; same answer?

A. Yes.

Q. And then Loud Poeschel Technical Report, that doesn't play any role on any of your opinions here?

A. No.

Q. Then the Poeschel Rendell Expert Report, does that play any roles in any of your opinions? He's a statistician.

A. Yeah, that's part of the review of the Red Book.

Q. That would be something that we should talk about?

A. Yeah, we should probably talk about that.

Q. Okay. And the Reference Manual On Scientific Evidence, I take it you didn't really look to that to --

A. I did look at it, actually, and I went through and read the engineering part of it. It was only a thousand pages. I wasn't going to read a thousand page document.

Q. Okay. All right. But is there anything in there --

A. No.

Q. -- that you were relying on? Then of course the Red Book, we know we're going to talk about that.

A. Yeah.

Q. At least gives me a scope here that would help me, I think pare down a lot of questions on these things that really don't have any importance to you in terms of your opinion.

All right. So looking at your exhibit -- what's that number, 620?

A. 620. My opinions?

Q. Those are your opinions or a summary of your opinions?

A. A summary of opinions.

Q. Do you have any other opinions that aren't expressed in this document?
A. No.
Q. So to be clear, I'm going to ask you some questions about your opinions but, I mean, you've given me kind of broad categories here. You don't have any opinions on anything else that relates to this case?
A. No, not at this time.
Q. All right. When did you first become involved in the case?
A. 19 -- 2019, probably summer/fall, somewhere in there.
Q. Who contacted you?
A. I don't recall who contacted me. It may have been Jim Hooper but I don't remember exactly.
Q. Okay. What were you asked to do?
A. I was asked to discuss with John Loud some experiments he was preparing to do.
Q. Did you do that?
A. Yes, I did.
Q. Did you have discussions with John Loud?
A. I had discussions with John Loud.
Q. Did you make any notations of those conversations?
A. No, I did not.

Q. And when did you speak with Mr. Loud?
A. It was in the -- during the fall, fall into probably November, thereabouts.
Q. Was it a series of conversations over time?
A. It was a series of maybe two or three conversations. I could go back and figure out what it is.
Q. How could you go back and figure it out?
A. I could go back and figure out when I had the phone calls with him.
Q. Okay. Do you have any memory of what you talked about?
A. Well, the things that we talked were John Loud was preparing to do some experiments with water bowls and contact resistance and cow resistance, and I provided some knowledge about how we had gone about it in our experimental behavior process and had some things that -- talked to him about some things that he might look out for, and that was about it.
Q. Was this where he was planning on doing some experiments at some farm in Wisconsin?
A. I believe it was a farm. I'm not sure where the farm was. I never knew the name of it but I -- either it was Minnesota or -- I don't recall.
Q. Does the name Dutch Dairy ring a bell?

A. Never heard Dutch Dairy until recently.
Q. Who told you about that recently?
A. It was in some of this documentation, I think, somewhere along the line.
Q. Have you talked to anybody other than John Loud about this case and of course the lawyers?
A. No.
Q. All right. So you haven't talked to David Reed or --
A. I don't know who David Reed is.
Q. Before I forget, where is Dr. Gorewit these days?
A. Dr. Gorewit has been retired for some time. I believe he's still in Ithaca. The last time I was there to see him was when my wife and my 50th wedding anniversary, and we had a party and I talked to him briefly at that time.
He lives around Ithaca and I haven't been in contact with many people over the past year and half.
Q. When was your 50th?
A. 2019.
Q. Okay. So you saw him last in 2019?
A. 2019.
Q. And have you talked to him at all about this?
A. No.

Q. Do you know if he's still testifying for utilities?
A. I do not know. I have no idea. You'd have to ask him that question.
Q. And have you testified in litigation before?
A. I've testified in litigation, yes.
Q. I think you testified in a case involving Bonneville and Kauch was the name of the plaintiff. Do you remember that?
A. Where was this?
Q. State of Washington?
A. Yes.
Q. You testified at several trials in that case?
A. I testified in one trial in that case. I think they had multiple trials. I just testified at the first one.
Q. You didn't testify at the second one?
A. No.
Q. And you testified on behalf of the utility in that case?
A. Yes.
Q. Have you testified in any other cases, either deposition or at trial?
A. Yes.
Q. Have you testified always for the utility?

A. I -- yeah, for the most part. I think there's been -- one of the first cases that I provided some opinion on was the one about -- for a horse that came in contact with electrodes on a gas pipeline, corrosion electrodes, but other than that, no.

Q. Okay. And I'm not sure I understand what that last answer is. A horse got electrocuted?

A. A horse got shocked. That was my first experience with the legal system in terms of -- all I did was provide an opinion for a lawyer for that.

Q. Okay. That was back in '91?

A. Oh, that was probably before then.

Q. In your CV that we just went through, you indicated you were a consultant for stray voltage litigation starting in 1991.

A. Yeah.

Q. Since then, since 1991, have you -- your testimony to the extent you've given it has been on behalf of utilities?

A. Those are the ones -- people who contacted me and asked for that, yeah.

Q. How many cases were you involved in?

A. Oh, I'd have to do a guesstimate as to that. I was involved in a number of cases in Michigan, probably 10 to 15.

Q. In Michigan?

A. In Michigan. One in Washington. I've been involved in one in Pennsylvania, one in Ohio, and neither one of those got to the point after deposition. I don't believe any of the ones in Michigan ever got to a deposition or, therefore, trial. Washington one did get to trial.

I was involved in one recent, in the past ten years, in Utah and that got to deposition and trial. That's about it I think.

Q. Is that where you first met Mr. Hooper?

A. That's where I first met Mr. Fitzpatrick and Mr. Hooper.

Q. In that Utah trial?

A. In the Utah trial.

Q. Okay. You gave a deposition and trial testimony in that particular case?

A. Yes, I did.

Q. Okay. Have you gone to farms as a consultant at any time?

A. We -- by consultant, are you -- I'm not quite sure what you're -- let's work on our definition. What do you mean by "consultant"?

Q. Well, have you -- Cornell's got an extension service?

A. That's correct.
Q. Do they have anybody that goes out and tests for stray voltage?
A. Sure.
Q. Have you ever done that?
A. Yes.
Q. And was that part of an extension obligation or duty?
A. I did not have an extension obligation but one of the things I referred to earlier was that we had a group that -- most of the people that were involved in the stray voltage research, and we did training for the utilities. We did training for the mastitis control or whatever --

Cornell has a group which goes out and does mastitis testing and other things, and we trained those people to go out, how to make measurements on dairy farms as part of their routine practice of doing mastitis control and milk quality. I think that's the Mastitis Control and Milk Quality Group.

So we spent time doing that. We went to a number of different farms in that process because we would take the people out to real farms to have them make measurements and then discuss all of that at a point in time. We had a three-day or about three-day

seminars that we did that over.

I was also asked on one occasion to go out and do some testing on a farm up -- by a consumer group, a state consumer group who had a complaint about -- over something. The people from -- a guy from milk -- Mastitis Control and Milk Quality and I went out and did some tests on that farm and reported for it.

Q. Was that in New York?

A. That was in New York. There was a complaint to the -- to some organization within it and it went -- and it came back through to us because we were doing work with mastitis control -- the Mastitis Control and Milk Quality group.

Q. Did you -- I don't mean to finish -- I mean, are you finished?

A. Yeah, I'm finished.

Q. You're going a little beyond my question but that's okay. So did you develop a methodology for doing your testing?

A. During this group we developed -- we developed a methodology that pretty much followed what was produced by the Red Book.

Q. Okay. You used a 500 ohm resistor then?

A. Yes.

Q. And are you familiar with the Docket 106 and

Docket 115 protocols?

A. I was at one time, and I don't know that I can give that to you verbatim.

Q. All right. So I mean, there was phase 1 and phase 2 testing as part of that?

A. Yeah.

Q. Did you follow that or did something like it?

A. We probably did something like it. I don't know that I know the explicit procedures that were involved in phase 1 and phase 2, but I would assume they're very similar to what we were doing.

Q. Now, your testing methodology, was it written somewhere?

A. We probably had it in a handbook somewhere.

Q. Do you happen to have that?

A. I don't have it with me right now.

Q. I know.

A. I don't know whether I have a copy of that anymore or not. This is stuff we did in the '90s.

Q. Does Cornell still do that?

A. No. This -- that came from a group which we also formed to look at stray voltage issues that involved -- it involved the utilities, dairy farmers, the cable industry, the telephone industry. The gas companies all had some kind of representation on it.

Public Service member from the State of New York was on it as well, and we held regular meetings to address some of the issues.

One of the issues with all those different utilities was they all connect to the neutral, and with the isolation things going on, it was easy for them to come in and bypass the isolation device. So we developed some protocols for that, for labeling for all those industries.

Q. Did you participate in the rule making in New York?

A. No. I don't know that there was any rule making in New York. I don't know that --

Q. Well, they adopted some action levels in New York. Do you know that?

A. Not at the state level that I'm aware of.

Q. That at a half a volt, there was mandatory isolation on demand. Did you know that?

A. No. In New York?

Q. In New York. Don't they call this the Empire State?

A. They call it the Empire State. When did that happen?

Q. I don't know. I mean --

A. I don't remember.

Q. I thought you'd know about it.
A. Maybe we did that. I don't remember the mandatory part of that.
Q. Okay. How much do you charge for your services?
A. I charge for my services over the years, anywheres from $100 an hour to $350 an hour.
Q. What am I getting charged today?
A. $350 an hour.
Q. And do you have the same rate for work on the file as you do for doing depositions or is it a different rate?
A. I have the same rate.
Q. Okay. So how much time have you put in on this case at this point in time?
A. At this point in time I probably have 30 to 35 hours in it.
Q. Have you done any billings on it?
A. I haven't done any billings on it.
Q. So do you think you might have a copy of the protocol at your home or somewhere?
A. I can go look but pretty much in the moves around, that's the -- and the fact we weren't doing workshops anymore, it's probably gone to pass. It's at least 20 -- pushing 20 years since we've done any kind

of work -- that I've done any kind of workshop.

Q. So 20 years gets you back to what, around 2000?

A. Around 2000.

Q. Is the last time -- did the funding dry up for that or what?

A. Partially the funding dried up for that. Partially we had difficulty getting facilities -- we used a facility for a lot of our experimentation, and there was a lot of demand on it, a little four-stall thing that's called LARTU. We had a lot more competition for that and I don't know that we had anything in particular that we had planned beyond where we ended up.

Q. Was there -- when you did these, you know, studies -- I mean training sessions, did you have handouts for that?

A. We had a booklet that went along with it.

Q. I'm going to ask you to look.

A. There was a workbook. I can go see if I can dig that out from someplace if you'd like.

Q. I'd like to do that and see, also, if you have the methodology or the protocol that you used for your testing and if you can locate those.

MS. MERCER-LAWSON: I will say that that

should go through the attorney. So go ahead and come to the attorney instead of Dr. Aneshansley.

MR. BIRD: Sure. And you give it to Ms. Mercer-Lawson here and then I'll -- I wouldn't get it directly from you.

MS. MERCER-LAWSON: You'll have to serve something on us.

A. My wife had a stroke a year and a half ago and we had to turn what was my office into a hospital room for her and my papers and what I had taken back from Cornell are scattered around wherever, so I'll try to see if I can find something associated with that.

Q. Okay. We've been going a bit.

MS. MERCER-LAWSON: Want to take a restroom break?

(A recess was then taken.)

BY MR. BIRD:

Q. Okay. So do you happen to have any of the depositions or other testimony that you gave in your possession, written copies of it?

A. Those are not things that I've kept.

Q. And then what is your current address?

A. 105 Southfield Drive, Fayetteville, New York.

Q. How far is that from here?
A. 15 minutes.
Q. Okay.
A. 20 minutes.
Q. You would come in on a freeway or something?
A. Yeah. It's east of Syracuse.
Q. So how many miles, 10 miles, 15?
A. It's probably 10 miles, less than 10 miles or so.
Q. Now, if you can look at Exhibit 620, I had some questions.
A. Sure.
Q. We're going to get to the Red Book in a minute. Well, I hope it's -- maybe not a minute but definitely, but the Red Book is what you describe as USDA Handbook number 696, Effects of Electrical Voltage/Current on Farm Animals: How to Detect and Remedy Problems. Correct?
A. Correct.
Q. And you are one of --
A. People refer to that as the Red Book. I don't think we ever referred to it.
Q. So I say Red Book in this deposition, you know what I'm talking about?
A. I know what you're talking about.

Q. Okay. I won't have to repeat that title every time. The reason it was called a Red Book is because it originally had a red cover.

A. That's correct.

Q. You're one of a group of University folks and USDA people that got together, first at Cornell and then in Minneapolis, to reach what was called a consensus on certain things related to stray voltage, correct?

A. I think it was a group that got together initially at -- within the ASAE organization and the idea was that there had been a lot of work done on stray voltage. This was an issue. We needed to provide some kind of document, handbook, whatever, that summarized what the knowledge was associated with this and see if we can draw any conclusions on it that would be helpful.

Q. Before that first meeting, Dr. Gorewit, he had been already testifying for utilities; is that true?

A. I don't know whether that's true or not. I'm not aware of his -- I know that he testified for utilities for a long period of time but I don't know when it started.

Q. Okay. All right. I wanted to talk to you about the first bullet point there and the statement you make. Second sentence, first bullet point is: "Its contents are, to this day, reliable, sound, verifiable,

and generally accepted within the scientific community."

That's the sentence I want to ask you about, okay?

A. Okay.

Q. Who currently generally accepts that it's in the scientific community?

A. I think the people who have worked on the science associated with this are people that believe in it, people involved in the Red Book.

Q. You mean the people that are authors still believe in it?

A. Still believe in it I believe.

Q. If they're still alive?

A. If they're still alive.

Q. Anybody else?

A. I think if a person -- a person in the scientific community evaluates what's in that, I think it's scientifically acceptable.

Q. No, I'm asking you a slightly --

A. I don't know who -- I can't tell you who exactly believes in it but I would --

Q. You know that Dr. Norell no longer believes in it?

A. I don't know that.

Q. Do you know Dr. Norell?

A. I've never met Dr. Norell.
Q. You know he did some studies out in Idaho that determined what cow resistance was?
A. I saw that he replicated some of the same studies that he had done in -- and I've seen that paper.
Q. That abstract that he --
A. The abstract that he sent. I have probably more questions about it, but it was similar to what he had done, and I didn't see much different from what he had done from his original work.
Q. Back in 1983?
A. Back in '83, and what we looked at based on what I could see from the abstract.
Q. Right. He wouldn't be a person that would still accept 500 ohms as the --
A. I don't know.
Q. -- worst-case source impedance?
MS. MERCER-LAWSON: Foundation.
Q. You don't know whether he does or doesn't?
A. That's correct.
Q. He's within the scientific community --
A. Yes.
Q. -- right; that you're talking about here in this opinion? Okay.
Anybody else that you're aware of that

accepts this paper within the scientific community besides the authors and potentially Dr. Norell?

A. I don't know that -- certainly I haven't gone out and surveyed the scientific community, so all I can base that on is what I believe that the scientific quality of that work was.

Q. Are you aware that, you know, Merck Manual adopted some of the lingo of the Red Book?

A. No.

Q. Do you know what the Merck Manual is?

A. I've heard of the Merck Manual.

Q. Were you involved at all in getting that, the part regarding stray voltage published in part of the Merck Manual?

A. I don't believe so.

Q. Did you work at all with Doug Reinemann in connection with his research on stray voltage?

A. What do you mean by work with?

Q. Had conversations with him, had conversations with him about to set up his experiments?

A. I don't know that I've had any -- we've had a number of conversations over the years, not a whole lot. I don't know that he ever asked for any advice on his experiments in particular, in terms of the design. We've --

Q. Where would you meet with him? Where did you see him?

A. The only place I would have run into him is at an ASAE meeting or he visited Cornell for some reason. I might have run into him at some point. I don't have a lot of contact with Doug but we've talked over the years.

Q. So let's go to the second bullet point there where the statement is: The USDA Red Book's age does not distract from its validity. It has been used to assist in developing policies and procedures.

A. Mm-hmm.

Q. Where has it been used to assist in developing policies and procedures?

A. Well, certainly in Wisconsin.

Q. As part of their protocols?

A. As part of their protocols.

Q. Docket 106 -- Docket 115?

A. That's my assumption. I don't know exactly how they developed or what their rationale was for developing the policies but they certainly heard about things that were in the Red Book from us and others.

Q. All right. And I have to -- let me withdraw that last question because I said Docket 106 and we know or we talked about earlier that Docket 106 came out

before the Red Book, and so as it developed policies, it was in Docket 115.

A. Okay.

Q. It came out after?

A. But they certainly heard information that was in the Red Book.

Q. Do you hold an opinion to a reasonable degree of scientific certainty that the Public Service Commission of Wisconsin was relying on the Red Book in whole or in part in adopting Docket 115?

A. I don't know what they relied on.

Q. Okay. So that would be an opinion that, at least with respect to Wisconsin you would withdraw that opinion to a reasonable degree of scientific probability?

MS. MERCER-LAWSON: Object to the form. Misstates testimony. Go ahead.

Q. Correct?

A. Repeat that question.

Q. The answer is you didn't know whether they did or didn't.

A. That's right.

Q. So what other place or places have developed policies and procedures based upon the Red Book?

A. I think we have -- in terms of the stuff

that we did with training people, I think Wisconsin and the people who have done workshops out there relied on that information as well.

Q. But do you hold that opinion to a reasonable degree of scientific certainty?

A. I think I can hold that to a reasonable degree of certainty.

Q. What people in Wisconsin are you talking about? The utilities?

A. Well, Doug Reinemann and his group out there that have done that stuff.

Q. Anybody else?

A. The people in Michigan have made --

Q. Michigan Energy people?

MS. MERCER-LAWSON: He's not finished with his answer.

A. It's a -- it's a handbook that's been out there from the USDA available to a wide variety of people, and I have some belief that -- maybe not great certainty of it, that it's been a very useful document.

Q. And -- okay.

A. And in determining how to proceed with doing investigations.

Q. So I was talking about Wisconsin. Who in Wisconsin other than Doug Reinemann would have developed

policies and procedures relying on the Red Book?

A. The State.

Q. The State in what capacity?

A. The Public Service Commission, I guess, is --

Q. That was the question I asked you before, when -- you think it played a role. To a reasonable degree of scientific probability, do you think it played a role in developing the protocol laid out in the order in Docket 115?

A. I answered that question I don't know exactly how they did that but my expectation is that they used that information.

Q. Now you're saying to a reasonable degree of scientific probability the Public Service Commission of Wisconsin was relying, at least in part on the Red Book in Docket 115?

A. I would believe that they took it into consideration in determining their -- in making their determination.

Q. That's not the question I asked.

MS. MERCER-LAWSON: Object to the form, argumentative. Go ahead.

Q. Did they rely on it, in your opinion, to a reasonable degree of scientific probability in issuing

the order on Docket 115; yes or no?

MS. MERCER-LAWSON: Form. Asked and answered.

A. I don't know what they did.

Q. All right. Any other place or governmental entity or organization that you're aware of that adopted policies or procedures in reliance upon the Red Book?

A. I don't have any others.

Q. All right. So you were -- you say the next bullet point, you're prepared to describe the reasons why the Red Book came into existence and further prepared to defend the methodology of our work referenced in the Red Book, notably Chapter 3 of the handbook. Correct?

A. Correct.

Q. I read that right?

MS. MERCER-LAWSON: Misstates testimony. You left out USDA Red Book a couple times. You asked if you read it right so that's why I was --

Q. What are the reasons the Red Book came into existence?

A. What are the reasons it came into existence?

Q. Yeah.

A. I think I answered that question. It was a

group of the ag engineers from the -- ag engineering and the American Society of Agricultural Engineers that were aware of this issue, were dealing with this issue throughout the country and felt it would be a useful document to have for a whole variety of people, particularly farmers, as well as the utilities.

Q. I notice in the preface of the Red Book that it says that no funding was accepted from outside sources. Do you remember that?

A. For the preparation -- for what?

Q. For the Red Book? I can go to the preface.

A. For the preparation of the Red Book?

Q. Yes.

A. That's correct.

Q. However, at least initially this energy thing from New York, they were going to provide the funding, right?

A. No. That was for research that we did, not the Red Book.

Q. Okay. So you're saying it's not true that in the lead-up to this meeting that you had at Cornell, which I think was May of '89 -- we'll get to it later.

A. Yeah.

Q. That your belief was that you were going to get funding from this New York energy group?

A. No.
Q. You're denying that?
A. I don't know that that had anything to do with the Red Book.
Q. Okay.
A. The funding -- those are two separate --
Q. Let me just back up and tell you where I'm going.
MS. MERCER-LAWSON: Were you finished with your answer?
A. They're two separate things. One was research that was being done and the other one was a group of people who decided to get together to look at all the research that had been done, and that was done without any funding.
Q. Okay. I understand.
A. And --
Q. All right. And you say you're "prepared to defend the methodology of our work." What was the methodology of your work?
A. The methodology of our work was pretty much how you would go about reviewing the literature and putting together in some kind of package that we felt was acceptable, was useful, and that meant having a number of different chapters in there that addressed a

whole variety of issues associated with stray voltage.

Q. So I'm not sure I quite understand that; that you and the other authors got together and you looked at literature and then you tried to synthesize that in some way to come up with the Red Book.

A. There were a group of people who were working in agriculture, with dairy farmers on the issue of stray voltage, and it was a complex issue, and when we came together, the -- we tried to break that down into the different categories -- different areas of study or engineering or biology and address that in a series of chapters.

So there are a number of chapters in the Red Book and they address a whole variety of things surrounding the stray voltage issue. So that's where we started.

Q. Okay. I got it, and have you fully described the methodology that you used?

A. Well, the methodology was then one that you use in standard engineering or in terms of science, so the -- there were chapters in there that are pretty much all about -- there were things about distribution to measurement.

Q. I'm talking about the methodology of the book itself. You're talking about the underlying documents

that you relied upon. I'm talking about what was the methodology of coming up with the book itself, and I just wanted to know if you finished your answer.

A. I think I've finished my answer.

Q. The Red Book does not involve any new research, correct?

MS. MERCER-LAWSON: Object to the form, vague.

Q. Is that true?

A. All the research that was in the Red Book was new at some time.

Q. But you didn't engage in any new experiments to create the Red Book?

A. No.

Q. It was based upon literature that --

A. It was based --

Q. -- was published in the past?

A. That's correct.

Q. And it's not a peer-reviewed document; is that true?

A. It's peer-reviewed in that the members of the committee all reviewed the entire book.

Q. But it's not peer-reviewed?

MS. MERCER-LAWSON: Object to the form, vague.

Q. Peer review --
A. Yeah. Yeah, no, it's not peer reviewed.
Q. Peer reviewed, just so we're clear, is when an author submits something to a referee journal --
A. The authors don't peer review the journal, yes.
Q. And there's blind reviewers, then that --
A. Absolutely, so it's not peer-reviewed.
Q. And you happened to write Chapter 3?
A. Dr. Gorewit and I wrote Chapter 3.
Q. Did you participate in writing all of Chapter 3?
A. I did not participate in writing all of Chapter 3.
Q. Did you review and approve all of Chapter 3?
A. We all reviewed all of the chapters and gave our approval of them.
Q. That would include Chapter 7?
A. It would include all the chapters.
Q. Chapter 7, you're familiar with Chapter 7?
A. I would have to review what Chapter 7 is. I don't know it right off.
Q. So let's go to the next bullet point. It says: Experimental tests and field experience support the conclusion that 500 ohms is a conservative estimate

of worst-case animal plus contact impedance value and 1000 ohms is a more realistic animal plus contact plus path to source impedance.

A. Okay.

Q. So what experimental tests supported the 500 ohms as a conservative estimate of worst-case animal plus contact impedance?

A. There were tests taken of what the animal -- the cow impedance was, and those were done under situations which pretty much eliminated the contact resistance that you would normally find in ordinary conditions of the farm.

Q. What were the ordinary conditions on a farm?

A. The ordinary -- they could be a whole variety of things.

Q. Would it include mouth to four-hoof contact?

A. It could.

Q. In other words, water to wet concrete?

A. Water to a wet concrete.

Q. So I mean, if I were to show you the Red Book now, would you be able to tell me by looking at the bibliography, which studies you were relying upon when you came up with this 500 ohms?

A. The studies that we were relying on were based upon the resistances that had been measured, and

there were a whole set of different studies on that. There's a table that goes through those.

Q. Is it the --

MS. MERCER-LAWSON: Were you finished with your answer?

THE WITNESS: Yes.

Q. Was it the resistances in those tables that you were relying upon?

A. That's one part of what we were relying on.

Q. What else were you relying on?

A. Well, we were relying on the fact that there was contact resistance associated with all of those as well.

Q. And --

A. And I think it was the Minnesota people, the Gustafson and Appleman who had a lot of experience, field experience with cows and cow contacts, and what have you, who pushed for the -- made the argument for the 500 ohm resistance in terms of what their experience was within their testing of -- in the field.

Q. So you would rely on Professor Gustafson for the contact part of that?

A. He was the one that pushed the 500 ohm and I would rely on -- we all relied, I think, on his arguments associated with that 500 ohm being a -- a

minimal kind of resistance for the cow and the cow contacts.

Q. Okay. And I'm trying to separate this out between the cow and the contact because those are two separate things.

A. There's really never been any good studies made of the cow contacts.

Q. So you were relying upon Professor Gustafson's field experience?

A. I think that's -- Appleman, Gustafson, they were the ones who were most influential in terms of pushing the 500 ohms as a cow contact -- of the total cow resistance plus the contact resistance.

Q. What is the resistance of a cow's mouth with water that's electrified?

MS. MERCER-LAWSON: Object to the form. Incomplete hypothetical.

A. Ask that question again, please.

Q. What is the resistance of the mouth of a cow when it's drinking with water when that water is energized or electrified?

MS. MERCER-LAWSON: Form, incomplete hypothetical.

A. I think that's one of the problems that existed in terms of data available to characterize the

contact resistances.

Q. Okay. You did -- you did your water bowl testing?

A. That's correct.

Q. And you came up with calculated resistances?

A. A wide variety of calculated resistances, yeah.

Q. Most of them were less than 500 ohms with some contact with water to the mouth and the metal grate?

A. Maximum, minimum.

Q. The minimums were less than 500 ohms?

A. It was -- I'd have to go back and look at that.

Q. We'll get to those.

A. Some of them were bigger. The minimum values were larger than 500 ohms.

Q. Is it your opinion that your tests were shading the resistance to something other than farm conditions because of --

A. We have laboratory conditions that did not reflect what goes on in a dairy farm. I think they were artificial.

Q. No, I understand that, but a cow is drinking out of water, that happens all the time.

A. Yeah.
Q. What was unusual about yours was that the back feet of the cows were on a metal grate?
A. They were on metal rods.
Q. Metal rods. Is it your view then that that resistance, the rear hooves of the cows to the metal rods didn't reflect on farm conditions?
A. I think the situation that we had didn't reflect entirely with what on-farm conditions are.
Q. So the mouth to the water, that's normal everyday on a farm?
MS. MERCER-LAWSON: Form, incomplete hypothetical.
Q. Cows drink water all the time?
A. Yes, they drink water all the time. They drink it.
MS. MERCER-LAWSON: He's not finished yet. Go ahead.
Q. Go ahead. If you're not done, let me know.
A. I'm done.
Q. To the extent that the water has minerals in it would be less resistance than some purified water?
MS. MERCER-LAWSON: Form, incomplete hypothetical.
A. I don't have a response to that.

Q. You don't know?
A. I don't -- I don't know.
Q. But can we agree at least on this; that cows drinking out of a water cup is something that happens everyday on dairy farms all over the country?
MS. MERCER-LAWSON: Form, incomplete hypothetical, asked and answered. Go ahead.
A. I don't know if I can answer that question. They certainly drink water.
Q. Cows drink out of water cups still today?
A. They drink out of troughs. They drink out of tanks. They drink out -- sometimes they drink out of water cups.
Q. Sure. If those water cups are electrified, then you're going to have a resistance with the mouth of the cow and the water. That's the contact point?
A. Yes.
Q. And if the hooves of the animal are on wet concrete, you're going to have a resistance there?
A. That's correct.
Q. Those would be the two contact points, correct?
A. Well, they would be five contact points.
Q. Are you familiar with any peer-reviewed publications or other publications having to do with

what the resistance is between cows' hooves and wet concrete?

A. I'm not familiar with anything that isolates that particular contact.

Q. So you're referring with Surbrook and Reese, that research that shows it was an ohm or less.

MS. MERCER-LAWSON: Form, vague.

Q. You're not familiar with it?

A. I'm familiar with Surbrook and Reese. I don't recall when that occurred, when that research occurred. When was that published?

Q. I believe it was 1988, I think. I'm sure somebody will text me and give me the specific cite but --

A. Yeah.

Q. But the point I'm making here is that did -- are you aware that Dr. Gustafson has testified about what the resistance is between cows' hooves and wet concrete with the manure/urine combination? Are you familiar with his testimony?

A. I'm not familiar with that testimony.

Q. You would accept his under-oath testimony as being truthful, I take it?

MS. MERCER-LAWSON: Assumes facts not in evidence.

A. Repeat the question, please.
Q. Would you accept his under-oath testimony as truthful?
MS. MERCER-LAWSON: Assumes facts not in evidence. Go ahead and answer.
A. Yes.
Q. If I were to tell you that he's testified that it was very low, 5 ohms or less, would you agree that that sounds realistic to you for a contact resistance?
MS. MERCER-LAWSON: Same objection.
A. For each hoof?
Q. Pardon?
A. For each hoof? Was there separation of the different hooves or was that just a contact resistance for all four hooves?
Q. That's for one hoof.
A. For one hoof.
Q. Reasonable? Sound reasonable to you?
A. I've never -- never made that measurement so I don't know whether that's reasonable or not.
Q. Okay. Are you aware of any -- as you sit here today, any published research, peer-reviewed or not, that concludes that the resistance of a cow's hoof and wet concrete is 5 ohms or less?

A. I'm not aware of any research on that.
Q. And you're not aware of any research that describes the resistance that exists at the contact point for a cow's muzzle and water that it's drinking that may be the contact point?
A. No.
Q. Okay. And you're aware of there's consistently then reports in the literature, and the literature that existed back at the time the Red Book was published, that shows that the impedance of the animal, without the contact, was as low as 244 ohms, excluding the bottom 10 percent?
MS. MERCER-LAWSON: Form, vague.
A. I remember 244 from some study.
Q. That was Norell.
A. I'd have to go back and look at that. I've seen that. Yeah, there are values in that range there.
Q. And what you're trying to solve for when you're providing this recommendation of 500 ohms is worst-case circuit impedance, correct?
A. What's worst case?
Q. It was defined in the Red Book, worst-case circuit impedance is cow plus contact.
A. Yes.
Q. It includes source and path?

A. That's right.
Q. Source and path is determined to be zero --
A. Yes.
Q. -- for worst-case circuit impedance?
A. Yeah.
Q. The objective there is to solve the problem so that no cows get affected by stray voltage, not just the average or median cows; is that true?
MS. MERCER-LAWSON: Form, incomplete hypothetical. Assumes facts. Go ahead.
A. What are we talking about the objective of? The objective of all these studies?
Q. No. The objective of the Red Book was to come up with a recommendation for what would be a test or a measurement but you were trying to say, well, what resistor should be used --
A. Yes.
Q. -- in lieu of the animal when we're doing tests?
A. That's correct.
Q. And the worst-case circuit impedance and the recommendation was 500 ohms?
A. That's correct.
Q. Correct?
A. Correct.

Q. And what you thought you were doing or wanted to achieve was that -- to pick a resistor that give results that would protect all cows from current; isn't that true?

MS. MERCER-LAWSON: Form.

A. I'm not sure that that was -- if you're going for the minimal one, that would probably be true, yes.

Q. When you -- you didn't want to pick a resistor that would be the average, you know, so people or cows that were less than 500 ohms might get shocked and cows that were over 500 ohms of resistance would not?

A. Yes.

Q. You were trying to give a recommendation to protect all the cows, which would be reasonable. I'm not --

A. Yeah, I think that's a reasonable approach to that, yes.

Q. Up to that point in time, the Red Book -- the primary method of cow housing was still the stanchion facilities with the hay and the central alley and the milking in place. Are you familiar with that? In other words, free stalls weren't abundant back at the time that this research was going on in the '80s?

A. We didn't have parlors, you're saying, back in the '80s?

Q. I'm not saying you didn't have some parlors. I'm just saying that the research that was done before the Red Book was done almost exclusively in either stanchions or tie-stall facilities?

A. That's probably true.

Q. I know that -- I think you folks, when you did the full lactation, you, I think, used or had those animals milked in the parlor?

A. Parlor, yes.

Q. Right?

A. They were in pens. They went from the pens to the parlor and back, yes.

Q. That research wasn't one of the research articles that was cited in the Red Book, right?

A. I think it's cited in the Red Book.

Q. You do? Okay.

A. I thought it was. I thought I went through that and read that.

Q. Maybe -- I'll stand corrected because we'll get to it. Okay. So then as you sit here today, you don't know if we have a 244 ohm cow drinking water standing with four hooves on concrete, whether that cow has a real world resistance of close to 244 ohms? You

don't know the answer to that one way or the other, I think?

A. Well, I think the 244 cow had a -- the mouth connection was through a -- I can go back and look at it, a metal piece -- what do they call it?

Q. A metal bit?

A. A bit, I think, in the mouth. That is not typical of what you would find in the real world.

Q. Sure, it isn't, but you don't know what the resistance of the metal bit is, right?

A. Exactly. We don't know what the resistance of the metal bit is. We don't know a lot of things about that surface contact. They're different -- they're contrived for that experimental situation.

Q. Right. So I'm just going to follow this through because this is where -- you're the electrical engineer and I'm just a guy -- I've never had -- I had a basic physics course but, you know, not really very good at electrical engineering.

But if you got -- assume we have a 244 ohm cow. You know one exists because Norell tested for it.

A. Okay.

Q. And in Norell's tests it went from 244 to 525 in 1983, right?

A. I'd have to go back and look for the exact

numbers.

Q. And he excluded the top 10 percent and the bottom 10 percent.

A. Okay.

Q. That was footnote --

A. I know he had percentiles that he looked at. I'd have to go back and look. In some cases he did percentile. I don't know if he did it in all of those. I can go back and look at it if we have to.

Q. The one I'm taking about is the 1983 Norell, which is cited in the Red Book, and it's reported in the Red Book that it goes from 244 ohms to 525 ohms excluding the bottom 10 percent and excluding the top 10 percent.

A. Okay.

Q. Does that ring a bell for you?

A. It rings a bell that he had separated them into 10 percent categories, yeah.

Q. But the bottom number that he reports, excluding the bottom 10 percent, is 244 ohms.

A. Yeah.

Q. Do you agree that such a cow exists even today?

MS. MERCER-LAWSON: Form, incomplete hypothetical.

Q. Maybe I'll restate. Do you agree that there are cows that are in the range of 200 to 250 ohms, excluding contact resistance?

MS. MERCER-LAWSON: Same objection.

A. I believe that you could make a measurement that might give you that kind of resistance.

Q. And when you say "might," I mean, you know Norell did it.

A. Yeah.

Q. He did it in a recent abstract and he published all his numbers.

A. I did -- he just gave percentages. I -- I'd have to go back and look at that. It was just a paragraph long and I wasn't sure -- we didn't even know whether it was AC resistance. I assume it was 60 hertz resistance.

Q. You know Neubauer has done this to thousands of animals.

A. Sure.

Q. He's tested them and he's coming up with cow-resistant values?

A. Yeah. I've seen lots of Mr. Neubauer.

Q. But they're in the 200 to 250 ohm range.

A. I've seen levels there, yeah.

Q. So can I ask you to assume for the purposes

of this question that we're dealing with a 250 ohm cow? What I want to ask you is about contact resistance.

A. Okay.

Q. Where do you come up with the other 250 ohms to get the 500?

A. Through the contact resistances.

Q. Okay. So there we go because it's either the muzzle or the feet. I'm looking mouth to four hooves.

A. Okay.

Q. And you don't know what the contact resistance is for the four hooves. You've told me that, correct?

A. Yes. Yeah.

Q. You don't know what the muzzle resistance is for the water.

A. That's right.

Q. All right. So you don't know what -- how -- what is the make-up of that other 250 ohms.

A. That's correct.

Q. All right. And if the contact resistance is less than 250 ohms, then 500 ohms wouldn't be a good resistor to use in making a test, correct?

A. Yes.

Q. You'd want to use a lower resistor?

A. Yes.

Q. And then in -- when you're saying 1000 ohms is a more realistic animal plus contact plus path to source impedance. We talked about the animal plus contact.

And the path to source, in order to determine that, would you want a tester to do a source resistance test?

A. Yes.

Q. And that's what 7 is equivalent or is that what it's called?

A. Basically you put the -- you do that with the 500 ohms.

Q. It's with and without the resistor --

A. With and without the resistor, yes.

Q. And you do that calculation?

A. Yeah.

Q. With that you can come up with that other number when somebody does the source resistance.

A. That's right.

Q. Then that would get added to the contact and the cow and the source which is -- includes a path.

A. That's correct.

Q. And then you come up with that number. Did you folks do any of that?

A. We do that all the time in terms of making

cow contact measurements. You're always -- you need the test not only for what the voltage is of the contact points but what that resistance is between the contact points and the source.

Q. Is it your belief that Neubauer doesn't test or try to figure out what source resistance is?

A. I don't know. I see a lot of open circuit measurements.

Q. Okay.

A. I --

Q. When he is measuring an animal that is in contact with the earth, with the hooves on the concrete, does that include source and path?

MS. MERCER-LAWSON: Form, vague. Are you talking about Neubauer?

A. Everything includes a source and a path.

Q. So his result of the testing, that is where the bit in the mouth and the animal with four feet on concrete, that would include source and path?

A. That includes -- you make a connection, which is a source resistance, which is a source -- which is a contact point resistance. I think he uses a knows clip rather than a -- on the nasal passages.

Q. Sure.

A. That's certainly not something that occurs

with cows drinking normally in the barn.

Q. Sure.

A. I think there's -- and I have a concern about what the pressure is that goes on that nose and on the septum in between. You can actually -- could actually damage that, do physical damage to it which would change the internal impedance of the cow.

Q. So you're saying if there's injury to the animal --

A. Yeah, you break down the barrier that's there, you're going to decrease the resistance.

Q. Have you seen the nose clip that he uses?

A. I've not seen him make measurements.

Q. It has little sharp points on it is that what you're thinking?

A. No, I'm thinking the pressure it puts on a nasal passage. I think he uses a fixed distance.

Q. So what's the resistance there? It would be close to zero I assume?

A. At that particular point?

Q. Right.

A. Yeah, it's going to be very -- I don't know what it's going to be.

Q. Do you know what resistance -- think you've already told me you don't know what the resistance is

mouth to water that's electrified?

A. Yeah.

Q. That's what you used in a bunch of your tests?

A. That's what we measured. We measured the current to the water bowl, yeah.

Q. You came up and those animals were -- had their feet -- their rear feet on a metal grate?

A. And they had their mouth in the water bowl or had their mouth on the plate in the water bowl and that causes differences as well.

Q. You came up with resistances, calculated resistances based upon your set-up which was using an isolation transformer, right?

A. Yes.

Q. You came up with resistances that were in the range of 250 ohms for that particular test, correct?

A. I think at one point in that test we came up with that, yeah.

Q. Okay. And yet you went along with this 500 ohms and I'm trying to figure out your test didn't involve knows clips. It involved the mouth through the water?

A. Yeah.

Q. So that's a realistic, non-Larry Neubauer

test; that's your test, and the only difference then is that it was on these metal bars?

A. Metal bars, yeah.

Q. And you don't know what the contact --

A. I don't know what the contact resistance was there.

Q. One of the things that I was -- just use of a term here I wanted to clarify what you meant.

A. Okay.

Q. Is the -- in the last bullet point, Dr. Aneshansley, fourth line down, you use the word "cow's internal impedance." What did you mean? Is that any different than the cow's impedance?

A. No.

Q. You meant the impedance of the animal. So when we're --

A. Excluding cow contact.

Q. Are you the one who came up with the Z1 plus Z2, plus Z3, plus Z4? That's your contribution?

A. That was one of my contributions.

Q. So we have source, path, cow, contact, correct?

A. You have source, path --

Q. Cow?

A. -- cow, contact, cow, contact, path --

Q. Right.
A. -- back to the source, yes.
Q. So there's -- so the contact is -- there's two contact points.
A. Yes.
Q. There has to be otherwise you can't get a current flow?
A. Current, yeah.
Q. So it's source, path, cow, contact 1, and contact 2?
A. Well, it's source, path, contact 1, cow, contact 2, path back to the source.
Q. Okay.
A. That's the complete circuit.
Q. All right. So when you're doing source resistance testing and using an element or someone; you're getting both paths in there?
A. You're assuming that you -- you make it a simpler circuit, which is source, the path, the cow, contact, the cow contact, and then a direct connection back to the source. You combine that into one resistance. That's what it allows you to do that.
Q. Just so we're clear, impedance is not the same as resistance?
A. Yes.

Q. Is that true?
A. Correct.
Q. It will -- tell us in laymen's terms what's the difference.
A. Impedance can involve -- there are three basic components in electricity; a resistor, capacitor, and an inductor, and if you look at models of the human system, and one of the papers that we did later on in the '90s looked at whether this was true for cows as well, but the impedance of a human being has been shown to be a resistor and capacitor in parallel at the contact points. Generally a fixed resistance, body resistance, and then another capacitor/resistor in parallel at the other contact point.
So that means it has some capacitance associated with it as well as resistance, and capacitors change their value, their resistance, in quotes, with frequency.
Q. So --
A. A capacitor is an open circuit, means it's a huge resistance because it's an open circuit.
Q. Right.
A. As you -- if you go to high frequency, it becomes a short circuit.
Q. Open circuit, you mean the current --

A. The capacitor is two plates separated by an insulator, and those have electrical characteristics.

Q. Okay. However, for purposes of testing, you're using a resistor and then the solution, the calculation would be an R value rather than an I or impedance value?

A. You can calculate what the resistance value is for that whole circuit by plugging -- there's a formula for what the impedance of a capacitor is, and you put 60 hertz into that, you can come up with a magnitude for the impedance, and the -- and use that as the total resistance -- just a resistant characteristic.

Q. So Ohm's Law, you recognize that as the law of physics?

A. Law of electricity, yes.

Q. As well?

A. Yeah.

Q. Well, electricity, physics. And this is volts equals resistance times current, right?

A. That's correct.

Q. That's the general formula. Or impedance times current depending --

A. You're talking about AC circuits?

Q. Right. So that's not a debatable topic anymore; that Ohm's Law is something that is an accepted

among all scientists as being a law on electricity, right?

A. Yes.

Q. Okay. So people can use -- if you have two knowns, you can solve for the unknown?

A. I hope that still works.

Q. I mean, yeah.

A. Yeah.

Q. It's a linear equation is what I'm trying to say. You know --

A. Volts, A equals B times C is a linear equation, as long as A, B and C are linear.

Q. Okay. Believe it or not, I'm done with that. I'm going to move on then.

MS. MERCER-LAWSON: Good time to take a short break?

MR. BIRD: If you'd like.

(A recess was then taken.)

BY MR. BIRD:

Q. I want to ask you about this paper. This is what I referred to as your water bowl study?

A. Yes.

Q. Are you familiar with that?

A. Yes.

Q. Can I use that lingo to reference it?

A. It doesn't separate it from many of the other studies, but if you want to do that, that's fine.
Q. Well --
A. This is the three-week study.
Q. Yeah.
A. Yeah.
Q. Well, actually I think you said it was 49 days --
A. The exposure was three weeks so, yeah, 7-week study or 49-day study, yeah.
Q. Okay. So this is a study in which you brought cows from the Cornell herd over to the LARTU?
A. The Large Animal Research and Teaching Unit of Animal Science.
Q. At that location you constructed four, like compartments or something?
A. At that site there were -- there was a test facility there that had four stalls in it.
Q. All right.
A. That was part of the physical structure of LARTU.
Q. So I'm trying to just get some of the basics on what happened, if you can follow me. Do you have a memory of that, what happened?
A. Yeah.

Q. Were you there on a daily basis to observe?
A. I was there on a daily basis.
Q. So the animals you were looking for were, as I understand it, either animals in the rise up to the peak of the normal lactation or on the way down and that is it. So it was like from 44 to 120 days; is that true?
A. The numbers are in there, yeah. I think most of them --
Q. But you could only do four at a time?
A. Could only do four at a time.
Q. And your object was to do a total of 30, right?
A. The object -- the objective was to do zero, a half, one, two, and four.
Q. Yeah, the treatments. I'm talking about the total number of animals.
A. And we were going to do six animals in each treatment.
Q. So six times --
A. Five is 30.
Q. So that meant that you had to have, for 30 animals and four stalls, okay, that meant you had to have seven and a half or eight sessions --
A. Yeah.

Q. -- of 49 days?
A. Yes.
Q. So the total length of this would have been 49 days times 8 --
A. Yes.
Q. -- correct? Doing that arithmetic --
A. Close to 400 days.
Q. It comes to about 400 days?
A. Probably a little bit longer, given movement of the cows back and forth, yeah.
Q. So it would have been over a period of more than a year?
A. Yeah.
Q. And the cows that were -- there was cows and heifers, right?
A. Yes.
Q. You're trying to do cows --
A. First-calf heifers I think they were.
Q. Well, once a cow -- after they have their first one, they don't call them --
A. Well, these were first -- I'm not -- that's -- that terminology I left to the animal scientists, and Dr. Gorewit, and what have you, and --
Q. So two of the heifers reacted violently and refused to drink for 36 hours?

A. I don't know that they reacted violently but they refused to drink for 36 hours.

Q. And that -- are you confident that that refusal to drink had to do with the fact that they were getting shocked?

A. Am I confident with that fact? I'm pretty sure that was the only thing that changed. They were drinking before that.

Q. Some of the others weren't drinking for up to 21 hours or --

A. We looked at the delay to which -- the number of minutes it was before they drank a gallon of water. This was from the control period to when the voltage was turned on, from that period on how long did it take them to drink a gallon of water.

Q. So with those heifers you took them out of the treatment, out of the experiment?

A. We did. We gave them water. Made sure that they were all right, and we didn't -- we were required to take them out of the -- which was good.

Q. Humanitarian?

A. Well, I think we say humanitarian but part of the whole process of doing these experiments, we had to get approval from the animal group -- whenever you do an experiment on animals, you set down a protocol for

them.

There was a veterinarian that came over and looked at some pretests of what we were doing to approve us to be able to do this, and one of the constrictions they put on it was if an animal doesn't drink for 36 hours, you have to give them water. 36 hours -- my understanding of the 36 hours was that's the maximum period of time that they'll leave an animal go without water before surgery or some kind of a procedure. That's where the 36 hours came from.

Q. All right. But you had two animals that were heifer that didn't drink for 36 hours. They were removed --

A. That's correct.

Q. -- from the experiment and their data not counted.

A. The data was reported that they didn't drink for 36 hours.

Q. I mean that --

A. We didn't have any data for them after that because we couldn't -- they couldn't be part of the experiment.

Q. Nothing about those two heifers was included in the final dataset that you evaluated?

A. In terms of -- yes, that's correct.

Q. Okay. Now --
A. But it was reported -- that was a significant part -- result of the experiment was those two not drinking.
Q. But then you also lost some other animals to disease during that time; isn't that true?
A. I don't think so. I don't recall that. We would have reported it if we did.
Q. I thought you reported it and I'll get to your report.
A. I'd have to go back and look at that.
Q. So you really -- what you had is not a single experiment involving 30 animals. You had a single experiment -- strike that.
When the two heifers were taken out, were there replacements put in for them that were part of the experiment.
A. No.
Q. So then you were down to 28 animals?
A. That's correct.
Q. And what you had then was seven -- well, for those two animals, were they in the same group of four or were they in different groups of four?
A. I don't recall.
Q. Do you want to look at your phone?

A. No, I want to turn it off. I thought I had done that. Sorry.

Q. No problem.

A. I don't recall what groups the two were in, whether they were in the -- we would only have had -- in any set of four, we would only have had one who was on the four-hole trial, okay? So in any of the set of four that we had there, it would only have been one of them.

Q. For those animals that weren't drinking -- in other words, they didn't drink for a period of time but they ultimately got a gallon of water before the 36 hours was up, the reason those animals were delaying drinking had to do with the electricity?

A. Yes.

Q. Okay.

A. That's our conclusion.

Q. And would you say then it's logical to conclude that those animals were stressed because of getting shocked by the electricity or fear of the electricity?

MS. MERCER-LAWSON: Object to the form. Vague. Outside the scope. Go ahead.

A. They -- my observation is that they didn't drink. As to whether they were stressed, all those other things -- there are things you can do to measure

for stress and what have you, and I'm not sure we did that with these. There were other cases where we looked at that, the stress cortisol and other things.

Q. I understand that but you believe that cows that are getting shocked are stressed?

MS. MERCER-LAWSON: Object to the form. Vague.

A. Again, it's going to depend upon -- I'd have to go back and look. There's literature that I'm recalling and it's going to be literature or tests that have done blood samples and looked at that in terms of whether an animal is under stress.

There were some other experiments done prior to this by -- I think it was Gorewit and Dan -- I can't think of her name right now. But that did look at that, put the electrodes on the udder, and I think they found -- I'd have to go back and look at that. That's the way to measure whether or not the animal is stressed.

Q. Do you know -- I mean, you're an electrical engineer. You're not a --

A. I'm not an animal scientist.

Q. Okay. So do you know what stress is generally? They talk about heat stress.

A. There's a whole bunch of different kinds of

stress. I know -- heat stress, I'm familiar with and reduction of milk production with that.

Q. And then there's comfort issues --

A. Comfort issues.

Q. -- and/or get poked with something. Is it logical that a cow that's getting shocked is stressed?

MS. MERCER-LAWSON: Objection. Outside the scope of --

A. I'm saying there are ways to measure that in terms of hormone levels and I think some of that has been done and there's been some indication that there can be stress at higher levels, as I recall. I'd have to go back and look at that.

Q. Okay. So all right. Let's move on to your paper here then. I want to go to page 1 and the authors are listed there.

A. Yes.

Q. Which of those handled the statistics?

A. The person that handled the statistics is acknowledged on page 2 -- oh, you're looking at page 1. In the acknowledgements, Ted Rounsaville was the person who was dealing with the statistics. From Animal Science had their own statistician that dealt with all -- I don't know, they dealt with all of it.

Q. He handled it, not you?

A. I did some of the calculations of things that he said we should do. But he handled the statistics.

Q. Do you know what statistical model he chose?

A. I think we looked at just -- the model we chose for this was a comparison of the -- the assumption that the cows were on the -- I don't know if it was assumption or reality but that the cows were on the decline in the lactation cycle.

Q. Well, they weren't at 44 days.

A. Okay. I don't know what --

Q. They weren't at 44 days.

MS. MERCER-LAWSON: Form.

Q. You're familiar with the lactation curve?

A. Yes.

Q. Would you agree with me that typical peak occurs in the 60 to 90 day range?

A. I'm not an expert on lactation curves but I -- that sounds like what I've heard before.

Q. So if a cow entered this --

A. On the 40th?

Q. -- 44 days here, that cow is on the way up to peak and not past the peak.

A. Yeah.

Q. You agree with that?

MS. MERCER-LAWSON: Form. Outside the scope.

Q. Do you have the question --

A. I don't know whether we had lactation curve data on these or not. That would have been something Gorewit could address but that looks like that was on the way up, yeah.

Q. And the animals that you had in this were -- ranged from 44 to 120 days in milk.

A. Yeah. They averaged 71 days in milk.

Q. And 71 days -- 71 days is right in peak or not quite, 60 to 90 days.

A. That's what they were. The data is -- the data shown there is 44 to 122 days.

Q. So the average you say was 71 days?

A. That's what average, 71 days with a range of 44 to 122.

Q. The average wouldn't be on the way down; it would be either on the way up or maintaining peak for a period of time?

MS. MERCER-LAWSON: Form, outside the scope.

Q. Correct?

A. I'm not an expert on lactation so -- that's a question for my friend, Ron Gorewit. I can tell you

what my knowledge of the experimental plan was that -- the analysis was to combine the last two days -- last two weeks and the first two weeks and compare it against the middle three weeks.

Q. Okay. So all right. Let me see if I have this straight because --

A. So that model would say that -- in prediction that, that they -- that model would be used if you were on the downside of the lactation curve.

Q. But I thought what you did, at least as reported in this paper, was to eliminate the first week completely?

A. We did eliminate the first -- did we eliminate the first week? Maybe we did. We eliminated the first week.

Q. I'm trying to find out what you did.

A. I'm trying to remember.

Q. Well, I can --

A. Let me --

Q. Maybe it would be simpler if I went through it with you.

A. Yeah, let's do that. It should say what we did. I thought I'd gone through this.

Q. Here, I'm going to withdraw the question and move on. I can't have you --

A. Okay.

Q. We got to get out of here. Going to page 2, you've -- and this is typical, is that you go through the history of what's known about the certain problems and then you quote from it, and I wanted to focus on paragraph 2 there for a moment where --

A. Okay.

Q. -- it says: Feeding behavior were modified and escape behaviors employed in an increasing fashion from 1 milliamp to 5 milliamp and that's Norell '83?

A. This is the second paragraph? We're on page 2, is it?

Q. Page 2, second paragraph, in the middle.

A. Average thresholds?

Q. Next sentence.

A. Oh, Norell. (Witness reading.)

Q. And some animals responding at 1 milliamp. So --

A. Yep.

Q. -- the literature -- and this is peer-reviewed published literature that supports the fact that the animals were having behavior responses at current levels as low as a milliamp?

A. Yeah, Lefcourt's work.

Q. And Norell?

A. Norell did some, you're right, from 1 to 5 milliamp increasing current. He increased currents from 1 milliamp to 5 milliamps. Okay. Yeah.

Q. And going to the bottom or towards the bottom, the second-to-the-last paragraph right before the word Objectives, the statement is made: As milk is 87 percent water, it is imperative that lactating cows obtain adequate supplies of water for milk production, correct?

A. Yeah.

Q. And then the last sentence: Proper water intake is also necessary for normal feed intake. Is that something that you agree with today?

A. That's something that was written by Gorewit and I agree with that.

Q. Okay. It's not -- neither of those are debatable points in science, correct?

A. I don't know.

Q. Well, proper water intake --

A. You need proper water intake and you need the proper amount of food. The last thing -- the -- the indication of water intake and feed intake, proper intake, water intake, and also is necessary for a normal feed intake. I guess that's true.

Q. Well --

A. True for all of us.
Q. -- if you don't drink enough water -- the cow doesn't drink water, it's not going to produce milk.
MS. MERCER-LAWSON: I was just getting in a form objection. Incomplete hypothetical. Go ahead, Doctor.
A. Yes, you need to drink water to make milk.
Q. If the cow doesn't eat, it's not going to get proper nutrition.
A. That's right.
Q. The idea here is that those two things are not something that scientists debate about.
A. Those two facts.
Q. They're accepted?
A. The last statement was water and feed combination --
Q. Yeah.
A. -- is something that I'm not sure is obvious --
Q. Okay.
A. -- to me as a layperson, but that's --
Q. All right. Then you refer in the last sentence on the objectives. It says: The effect on animal health and reproduction are described elsewhere, and you cite Gorewit, et al., and that would be at

87-8035?

A. That's the companion.

Q. That's the companion study from the same test?

A. Yes.

Q. Okay. And what you were doing for this particular paper was drinking behavior, consumption, and drinking patterns, quantity and quality of milk, nutritional intake and animal health and reproduction?

A. Yes.

Q. So going to page 3, you used 15 first-calf heifers and 15 second to fourth lactation cows.

A. Mm-hmm.

Q. You selected those or somebody selected those from the herd. Who did that selection?

A. That was Ron Gorewit's team.

Q. And those animals were transported in sets of four or less to the LARTU for the experimental period, correct?

A. That's correct.

Q. When you did the first four animals, Gorewit went over there and picked these cows and heifers out, the first four?

A. He gave -- he didn't go out and go into the Animal Science pens and say, I want this one, this one,

and this one. He gave some information about what he wanted for cows for this experiment to the people at the farm and they went through the records and provided -- my understanding is that they provided those to him. They may have given him a selection to look at.

Q. His criteria were what?

A. His criteria was that they should have been in --

Q. Well, it's stated there. I don't want to leave you in suspense. It says, the last sentence of the first paragraph says: Animals were selected based upon, one, their stage of lactation.

A. There you go.

Q. Two, previous health and productions, more than 40 days in milk; three, no history of significant health problems, and, four, milk production greater than 20 kilograms per day.

A. Good.

Q. You were looking for animals that were more than 40 days in milk at the start of the two-week period?

A. Mm-hmm. That's what it says.

Q. You're willing to accept cows that were on their -- in the two-week period preceding, they were increasing production -- if they were less than 90 days,

they would be increased, or at peak at the beginning of the experiment. Unless they were 120 days in milk, in which case they'd be on the way down.

A. Yeah, I don't -- it is what it says.

Q. Okay. I do have it. Do you have the ages of these animals or where are the statistics for this? University still have them?

A. I doubt that they have them at this point.

Q. Okay. Did you ever see the statistics, the data?

A. I didn't see the statistics in terms of the selection. That was handled by the Animal Science team.

Q. So it would have been Gorewit, not you?

A. Yeah.

Q. You were more involved in just setting up the electrical aspects?

A. And the collection of the data.

Q. And so the animals, they were milked twice a day?

A. Correct.

Q. And who did the milking?

A. We had a -- Linda Price for the most part.

Q. Who?

A. Linda Price.

Q. Did she do both -- they were done on 12-hour

intervals. Was she doing the morning and evening milking?

A. As I recall, yes.

Q. She did all the milkings for all the animals?

A. I can't tell you that for sure.

Q. They were milked at the place where they were getting shocked?

A. That's correct.

Q. And so they used what, a -- was it an automatic milker, bucket type thing?

A. A bucket milker.

Q. But it was automatic?

A. Automatic, yeah.

Q. They weren't milked by automatic --

A. No, no, it was a regular --

Q. Was it a portable unit?

A. Portable unit.

Q. And it had a vacuum hose?

A. And a vacuum hose.

Q. And the bucket was taken and the milk was weighed?

A. That's correct.

Q. So you had production records for individual animals?

A. For each milking.

Q. For each milking. But then you also had totals, and the idea was to have two weeks pretreatment, three weeks treatment, and then two weeks post treatment?

A. That's right.

Q. And the idea was to compare whether or not there were any changes?

A. Correct.

Q. And then you did a bunch of charts at the end. And then there's a schematic diagram attached to this and that's on page 11, right? Figure 1?

A. Correct.

Q. It's 11, yes. And the transformer you were using, was that an isolation transformer?

A. Yes.

Q. So in the upper left-hand corner where it says Transformer (0-4 volts), that was an isolation transformer?

A. Yes.

Q. And it wasn't grounded?

A. That's correct.

Q. The metal mat was grounded?

A. The metal mat was on the floor and grounded, was --

Q. And so then the cow was -- the water was

there in a little sort of semi-circle there?
A. Yeah.
Q. And you were measuring from the mouth to the rear hooves?
A. That's correct.
Q. And then you were getting -- applying certain voltages? You were able to calculate cow resistance and also determine current?
A. Yes.
Q. So --
A. We had a water meter on the waterline.
Q. Meter on the waterline. Now, the waterline, that would be a parallel path?
A. No.
Q. Well, the water came from somewhere.
A. Yeah, there was a 50-foot hose, garden hose that connected to the water system to isolate that.
Q. The water itself would be a parallel path?
A. The water would be a parallel path.
Q. And --
A. But a very high resistant path.
Q. Right, but, you know, under the normal thing --
A. Yes.
Q. -- the current is going to take all paths in

reverse order of resistance or there's some rule of electricity that's says that. It's going to take all paths that are available?

A. Yes.

Q. So the metal mat, what was that made of, metal?

A. Metal mat was actually -- this was a set of rods that went across and when the cow defecated, it went through those rods, down into a holding container for the waste, and then that container was removed periodically to get rid of that but -- so it had slots in it.

Q. So then it had some -- it did have 100 percent surface contact with it because there were spaces in between where the urine and feces would go down?

A. That's correct.

Q. So this was not an experiment to get current through all four but instead just the two rear hooves?

A. Yes. For cow comfort reasons, we had to have some matting in the front part.

Q. Okay. Let's go to page 4.

A. Page 4. Okay.

Q. It was divided into a two-week pretest period, three-week treatment period and two-week

posttest period?

A. That's right.

Q. You gave five treatments with 0, 5, 1 --

A. .5, 1, 2, and 4.

Q. And you -- you were using 60 hertz?

A. Yes, that's what it says.

Q. Okay. Now, if the four animals were in there, did one of the four get 0 or did -- because you got five things you're trying to test and only four spots.

A. That's right.

Q. So were there times when you would test and none of the four cows got zero?

A. I think that's the case. That has to be a time -- so we have five treatments. Back to the 30 animals, we have to do six runs. Yeah, I think that's true, yes.

Q. You can only do four --

A. Yeah, I don't --

Q. So how were those treatments determined? Were they randomly assigned or were they predetermined how many -- which treatments are given to a group of cows or heifers would get? Who made that decision?

A. That was made by Ron, by Dr. Gorewit and the statistician, and I'm not sure how they did that.

Q. Was there the same number of zero tests as 1, as 2, as 4 or .5 or don't you know?
A. All cows received one of the treatments.
Q. Okay.
A. Not all cows. A cow received a treatment.
Q. Okay.
A. And at one time we could only do four treatments -- at any one time you could only do four treatments, and I don't recall exactly how we set that up so that we got through all of the 30 treatments that we had to do. But obviously we weren't doing all five treatments every time.
Q. Right.
A. We were only doing four.
Q. Right. And so when four animals would go in, somebody decided which treatments they were going to get?
A. That's right.
Q. Do you know how that got decided?
A. I don't recall how that got decided other than on the Animal Science side.
Q. I don't see that explained in here. That's the reason I'm asking.
A. Yeah, I don't either so --
Q. Okay. All right. Then the thing that causes

me to think that you added two animals was that second-to-last paragraph there on page 4.

A. Yeah.

Q. There were eight experimental sessions. The last session was planned for two animals but actually had four animals, two of which were replacements for animals from previous sessions that had to be dropped from the study because of injuries and sickness.

So that's different than not drinking water for 36 hours. Do you agree with me on that?

A. That's right.

Q. So there was two -- the two animals were taken out of the study in the initial 36 hours or around that time because they wouldn't drink. So now we're down from 30 to 28?

A. Yes.

Q. And I think you said those animals were not replaced but then --

A. They were not replaced.

Q. But then at the end, two animals were replacements for animals from previous sessions that had to be dropped because of injuries or sickness; is that true?

A. Yes, I guess. I don't remember that.

Q. Okay. Well, I'm just reading what it says.

A. Yeah.
Q. Injury or sickness is not the same as not drinking water.
A. Yeah.
Q. I think your testimony is that those two, two heifers that didn't drink for 36 hours, they went back to drinking and weren't affected.
A. That's right.
Q. They were just completely removed from the experiment.
A. Yeah.
Q. Correct?
A. Correct.
Q. They didn't rejoin the group; is that correct?
A. That's right.
Q. So when we -- what happened then was that somewhere two -- one of the sessions, two or maybe one or more -- two heifers were lost, which brings your total animals down to 28, and then at some other session, two other animals had to be removed, and then they were replaced at the end with two more animals.
A. Yes.
Q. So we're still at 28 animals?
A. Yeah, we still had the 28.

Q. You never actually got back to 30 animals --
A. That's right.
Q. -- that were tested?
A. 30 animals were tested but two of them were removed.
Q. And there was two of the 28 --
A. There were two other but there were replacements for those, so we're back at 30.
Q. So the data for the two animals that had to be removed for injuries or sickness, was that data not included?
A. No, that was included. The two animals that were removed? Was that included?
Q. Yes.
A. No, because I think they were removed well before we got into the -- well, I don't remember exactly what the injuries or sicknesses were for those two but they were obviously taken out for those injuries and sickness.
Q. Well, I mean, it wouldn't be unusual for --
A. They could have fallen down and had a cut or whatever, but there was something going on with a couple of them and they took them out and just put in two for them.
Q. There were no cows with clinical mastitis

going in, as far as you know?
A. As far as I know.
Q. A lot of the animals developed mastitis while they were in the treatment; isn't that true?
A. I'd have to look at the data for that. Did we do mastitis in this one? That would be in the following analysis.
Q. No, but if the cows were identical, was the treatment stopped and then they're removed --
A. If they had mastitis?
Q. Yeah.
A. Not that I know of.
Q. Were they given treatment?
A. They were given treatment.
Q. But stayed in the study?
A. Stayed in the study. That would be my -- that's stuff that was done by the Animal Science people, and I'm guessing as to exactly how we did that; okay?
Q. All right. So --
A. I may have known at one time but I don't recall at this point.
Q. It says daily values were averaged by week?
MS. MERCER-LAWSON: What page are you on?
MR. BIRD: I'm on page 5, second

paragraph.

BY MR. BIRD:

Q. And comparisons were made between these weekly averages to determine differences between the animals, correct? Did I read that correctly?

A. Where are you?

Q. Page 5, second paragraph, last sentence.

A. Daily values were averaged by week.

Q. Then going to the next paragraph is where this issue on week 1 comes up?

A. Water consumption.

Q. It says week 1 of all animals, for all voltages, is significantly higher than almost all the other weeks. And there was an increase in water intake for almost all animals, particularly heifers during their first week in the LARTU and is presumed to be part of the adjustment period; therefore, data from week 1 was not used as part of the pretest baseline, only data from week 2 was used.

A. Yes.

Q. Okay. So what you had then was not -- your data was not two weeks pretest, it was one week pretest?

A. One.

Q. And two weeks post test?

A. Right, and three weeks of test.

Q. When this was published in the Journal of Dairy Science, it was described as ten and a half days pretest and ten and a half days posttest. How did that happen? Where did that change come from?

A. I don't know. That was probably made by Gorewit and Rounsaville in terms of doing their analysis.

Q. I mean, those numbers don't really -- because you got 14 and 14 days. At the Journal -- I mean, did you just decide to switch the statistics from one week and two weeks at the end to ten and a half days before and --

MS. MERCER-LAWSON: Object to the form.

A. It sounds like --

Q. You got to let me finish my question. She's going to object to the form.

MR. MERCER-LAWSON: First of all --

Q. I want to get my question out before she objects. Listen to my question. Let her object and then you can answer; okay? All right.

So what you just described to me was we had an initial experiment and two weeks pretest and two weeks posttest, three weeks of test and a total of seven. In this paper, 3034, it's stated that statistics from week one were not included so now we're evaluating

statistics from one week pretest, three weeks test, and two weeks posttest. Do you have that in mind?

A. Yes.

Q. Then in the Journal of Dairy Science article what you said is you had statistics, you evaluated them for ten and a half days before and ten and a half days after. Do you know how that happened?

MS. MERCER-LAWSON: Object to the form and perhaps you'd like to show him the Dairy Science article.

MR. BIRD: I'm sorry, what?

MS. MERCER-LAWSON: Perhaps you'd like to show him the Dairy Science article you referred to.

BY MR. BIRD:

Q. Do you remember that happened?

A. I don't remember that that was how --

Q. Let me show it to you?

MR. BIRD: Why don't we mark 30352 at the same time.

(Exhibit 622, "Effects of Neutral-to-Earth Voltage on Animal Health and Reproduction in Cattle," 87-3035, marked for identification, this date.)

(Exhibit 623, "AC Voltages on Water

Bowls: Effects on Lactating Holsteins," marked for identification, this date.)

BY MR. BIRD:

Q. So I'm going to go to -- just in order to answer this question, I'm going to get off of 3034 for the moment and just show you where the ten and a half days come from. The Journal of Dairy Science article, what exhibit is that?

A. 623.

Q. Okay. Exhibit 623 is Journal of Dairy Science, 1989, 72:2184-2192, and I'm on page 2185, left column, bottom where it says: "The experimental period was divided into three periods, 10.5 day pretest period -- "

A. Sorry, what page are you on?

Q. 2185. It's the second page.

A. Yeah.

Q. Left column, bottom.

A. Yep.

Q. Okay.

A. See it.

Q. It says: A ten and a half pretest period, a 21-day treatment period and a ten and a half day posttest period. How did that occur?

A. That was a decision made by the statistician

and Gorewit.

Q. So is that what happened?

A. This is a process where we present a paper at the ASAE conference and get feedback on it, and I don't know what the feedback was, whether it was feedback on that part of the process or not. When it came time to write this, Rounsaville and Gorewit decided to change the periods that we were comparing. I don't know what the reason for that was exactly.

Q. Well, nobody ever told you? I mean, what ten and a half days before did you pick?

MS. MERCER-LAWSON: Foundation, asked and answered. Go ahead.

MR. BIRD: It's not asked and answered.

Q. The ten and a half days just before the treatment period or was it the first ten and a half days?

A. No. My understanding was it was the ten and a half days prior to the start of the treatment, ten and a half days after the treatment.

Q. So you -- what was lopped off then for each period that was not treatment was the beginning, three and a half days of pretest was taken off, that data, and then at the backside, three and a half --

A. The three and a half days added -- there

were three and a half days added in the beginning because we were getting rid of the first week. We just did the first week in the ASAE paper. We're in the second week in the ASAE paper. So they added three and a half days there and they took three and a half days off of the backside.

Q. But you had data from all two weeks before and data for two weeks after?

A. That's right.

Q. And the final article then was based upon ten and a half days before and ten and a half days after and you don't know the reason why that was done?

A. I think it's ten and a half days and ten and a half days at each end and I --

Q. To balance it out?

A. To balance it out, but I don't know. The answer to your question is I don't know or I don't recall.

Q. All right. So now looking at the authors of Exhibit 623, none of those authors is a statistician?

A. No. But, again, you'll find in the acknowledgements Rounsaville's name.

Q. I don't think there's anything in here to indicate there was a statistician that was involved. Wait, at the end --

A. At the end, Rounsaville, for his guidance in analyzing the data. He was the in-house statistician for Animal Science.

Q. The study was financed by the groups that are listed there?

A. Yeah. I can go through this if you like. What page again?

Q. Page 2192, the acknowledgements at the end?

A. The Empire State Electric Energy Research Corporation, the Wisconsin Electric Utility Research Foundation, and the New York State Agricultural Research Experiment Station.

Q. And do you know if that was the statistician that told him to do it that way or was it somebody from the Journal of Dairy Science on a review told them to do it that way?

A. I don't know.

Q. Now, the same statistician, Rounsaville, he was the statistician for 3034, right?

A. Yes.

Q. You didn't change statisticians?

A. No.

Q. Now, for the two animals that were removed for sickness or injury that we talked about, were there placeholders put in to -- for them or not?

A. I don't recall.
Q. When those animals were removed, was -- how did you account -- if you did have replacements, how did you account for the water consumption? You were measuring that --
A. Individually.
Q. Okay. Individually?
A. Yes. There was a water meter on each of the stalls.
Q. I know but if there was no animal in the stall, then they weren't drinking any water.
A. There wasn't any water available.
Q. I'm just wondering how the statistics were handled. Was it divided by the same number or did you decrease --
A. Every stall -- every water bowl had its own water meter, so if there was a cow in the stall that was drinking, we were monitoring the water consumption. We didn't -- we didn't monitor total water consumption for all cows. We monitored individually for each stall.
Q. What about the water that had been consumed by those animals up until the time they were removed?
A. They were not -- that's not -- didn't get included.
Q. It didn't get included?

A. No. They weren't part of the study.
Q. And their milk production wouldn't have been included either?
A. No.
Q. Okay. Let's go back to 3034. You can go to the bottom of page 5. I'm just reading from the bottom last three lines: The other 28 animals drank but the time taken to begin drinking directly related to voltage. There is not a significant difference between 0 and .5 volt but there are significant differences between zero and all other voltage levels.
A. Correct.
Q. So that the delay in drinking is something that had a significant difference when voltage was applied?
A. Yeah, I think that was one of the findings of the --
Q. If a cow doesn't drink, it's not going to make milk?
A. That's correct.
Q. And if a cow, you know, doesn't drink for 35 hours as opposed to 36 hours, it's -- there's an interruption in its milking. Do you know enough from the science to say whether or not that cow is going to have reduction in milk production as a result of that?

A. It's certainly going to have reduction in the milk production in the short-term.

Q. Sure. Okay. So that -- and that's what you found here?

A. Yes.

Q. And the farmers are in a slightly different situation. You were monitoring when they were starting to drink but the farmer, with a herd of animals, unless he's got an eyeball on every animal, isn't going to know what cows are refusing to drink?

MS. MERCER-LAWSON: Form. Assumes facts not in evidence. Incomplete hypothetical. Foundation. Go ahead.

A. Repeat the question, please.

Q. Typical farmer, you've got a hundred cows and he brings them into a parlor twice a day to get them milked. He's not out there watching what every individual cow is doing with respect to drinking?

A. Absolutely.

Q. If that cow is getting a milliamp and that particular cow isn't drinking, he's not going to know it. He's going to find out when he brings that cow into the parlor and all of a sudden milk production is down, but he doesn't at that point in time know the cause of that?

MS. MERCER-LAWSON: Form. Compound hypothetical. Assumes facts not in evidence. Foundation. Go ahead.

A. I'm not quite sure what the question -- when the cow comes into the parlor and the milk production is down, you want to find the reason for it. And --

Q. It might be the cow didn't drink?

A. If you're not monitoring current and water bowls, not monitoring water that each cow is drinking, you don't know whether or not that's a factor in it.

Q. Correct. That's true, right?

A. Or any other factor, yeah.

Q. Right. In this particular study, you folks just happened to be watching when the cows started drinking but that's not a normal on-farm thing that farmers do. They're not out there watching when their cows are drinking water.

MS. MERCER-LAWSON: Object to the form and to counsel's testimony. Go ahead and answer the question.

A. I'm not sure what that has to do with the study.

Q. I'm not either. I'm asking a question how that gets related and how the findings of this get related to the real world.

A. This gives us an idea of when a cow begins to receive current.

Q. Right. What I'm trying --

A. You can follow it through to see at that level, does it affect water consumption?

Q. You found a significant difference between zero and all groups, except for .5, in terms of the delay in starting milking, correct?

A. The delay in --

Q. Starting drinking.

A. In starting drinking. We found out how long -- when we made the change from control period to the treatment period, and we look at it for the -- all the stages, we compared how long it took for them to drink the first gallon of water, and there was a correlation between that, the length of time, and the magnitude of the treatment.

Q. Did any of these cows that you tested have shocks leading out to parturition or calving?

A. We're in the position of the farmer I think at that point. How do we know?

Q. Do you think that the Cornell herd had stray voltage, a problem with stray voltage?

A. I don't know of any that they had.

Q. Was it ever tested? Did you ever test the

facilities?

A. I think we -- I don't recall. But I think we certainly, when we went out to do the full lactation studies, we did a variety of tests to make sure there was no background stray voltage.

Q. But not --

A. I don't know that we did that prior to this.

Q. Are you aware of any study that tested animals where in the pre-calving period, the animals were getting electrical shocks; they were getting electrical shocks immediately upon giving birth; and then continued to have shocks for 365 days after that time, minimum?

A. No, I can't recall any.

Q. The study you like to refer to as the New Liskeard study came closest to that. Do you remember that study?

A. I recall that.

Q. The New Liskeard study, they started applying shock at some point after calving, and do you know how many days after calving --

A. I haven't -- I haven't looked at that study. I'd have to review that. But I remember the New Liskeard study, yes.

Q. You were communicating with that fellow up

there in Ontario, weren't you?

A. I think Ron Gorewit was communicating.

Q. That wasn't you?

A. I don't recall.

Q. So in terms of conclusions, the impedance are in line with reported body impedances for cows. I'm on page 7.

A. Yeah.

Q. Go to page 7. So number 1 -- I'm on number 1.

A. Yeah.

Q. They received shocking currents that are in line with reported body impedances, correct?

A. Yeah.

Q. The amount of water consumed does not change with voltage treatment in those animals that drank, correct?

A. Yes.

Q. I want to ask you about that but there were two that didn't.

A. That's right.

Q. Of those animals that drank, they didn't drink -- there were some that didn't drink for a period of time but then resumed drinking at pretreatment levels after that?

A. Yes.
Q. Does your statement here in number 2 mean they drank enough that they made up for but they missed or are you just simply saying that they resumed drinking at the same level?
A. I think both of those things happened.
Q. Both of what things happened?
A. They resumed drinking and within the milking period, got enough water in. Whether they had a long enough delay that it was going to affect milking production over the short-term.
Q. But they would have lost milk production when they weren't drinking.
A. If they didn't drink for a long enough period, yes.
Q. So some animals will not drink from an electrified water bowl, because of a cow and heifer that refused to drink for 36 hours during a 4 volt treatment; is that true?
A. Yes, that's what it found.
Q. That it was your belief that animals adapt to voltage in different ways at different voltage levels.
A. Yes.
Q. So item 5, that milk production is not significantly reduced by voltage as might be expected as

there is no difference in water consumption; however, there is a trend towards more animals having significant reductions and there being larger reductions with increased voltage. Is that a true statement?

A. Yes.

Q. Okay. The number of animals were too small and the variation in milk production too large to find significant differences.

I'm having trouble understanding that last sentence. Do you understand it? Can you explain it to me?

A. That was -- I think we had such large variations in the differences that for the short periods that we looked at, there were -- we had some, at least in the analysis that we had done here, had trouble finding significant differences in the milk production.

Q. So what are you saying? Your --

A. I think part of this is -- part of this study is what led us to the full lactation study.

Q. Okay.

A. There were some indications that were saying there was no difference in milk production but there were variations in the short-term that caused some significant differences in that -- in the variation that didn't allow us to pick out where the milk production

changes occurred. I think that's what we're saying.

Q. But there were changes in milk production.

A. Yeah, I think that's what we're saying. There were changes in milk production.

Q. It wouldn't be truthful to say there weren't changes in milk production?

A. The statistics lead you to believe that but there were large variations, so that's what that statement is about is that, yeah, we can show some time-wise temporal variations, large -- over the large run. Those temporal variations were affected by the initial changes in the amount of water that they drink and over the long-term those variations affected the whole process of trying to find significant differences.

Q. And I'm trying to maybe draw a fine line here. The study showed that there were large variations in milk production according to the level, increasing level of voltage; isn't that true?

A. It showed there are differences in milk production, part of which were in the model that was used in terms of comparing the end result -- the two control periods before and after to the averages for the whole period.

Q. Right. And --

A. But if you looked at short -- week 1, week

2, week 3 of the production period, there were -- there were cases where you could be -- you could be able to show but overall, in the end with that, there was -- and with the model that was used, that we were not seeing significant differences in milk production for the whole experiment.

Q. Well, and that's because of the strength of the -- it was inconclusive then?

A. Yeah.

Q. You didn't reach a conclusion that there wasn't a change in milk production --

A. We showed differences in milk production over the initial -- during the different time periods of the test period.

Q. Right. During the treatment period?

A. During the treatment period, but if we looked at it overall, where some of those initial changes, caused by the fact that they didn't drink for long periods of time between the treatments, showed initially there were some reductions in milk production.

Q. So you're showing a more dramatic decline with ever increasing voltage in this study, correct?

A. Yes.

Q. Except that what you're saying is that the experiment as was set up wouldn't permit you to conclude

that it was true that you would have an overall, because of the statistical model that was chosen?

A. Because of the statistical model that we chose and the way the data was analyzed for the whole period, you could draw the conclusion that there was no significant difference in -- in the long-term, the three week period, with the milk production.

Q. It's true then that the best you can conclude from this is while we found significant changes in milk production, they were not statistically significant because of the model that we chose?

A. I don't know whether it was the model or whether it was the variation that we had in all the milk. I think my explanation, it was the variation that we had would allow that.

Q. My point is that it wouldn't be truthful to say we didn't see changes in milk production. You couldn't make that flat statement?

A. I don't think we made that flat statement. We showed the changes in the graphs and what have you, compared and showed there were periods of time where there were significant differences in the milk production during the different weeks.

Q. So if someone was testifying about what you concluded here, it wouldn't be truthful to say that this

study concluded there was no decrease in milk production related to voltage. The best that could be said is we couldn't conclude one way or the other?

A. No, I think we could conclude for the total period of three weeks, that the animals drank enough water over the latter part of it to begin to make up for what it lost at the beginning.

Q. But the milk production still went down?

A. It went down, yeah, and -- but for a short period of time.

Q. Once it went down, it kept going down, right?

A. No, it went back up. It varied between cows.

Q. You have a graphic in here that shows this?

A. I have the graph that shows it.

Q. And I don't see -- let's go to that graph. First of all, before I get there, one of the references was Bodman and Stetson. Those are two credible scientists from Nebraska?

A. That's correct.

Q. And in fact Stetson was one of your collaborators in the full lactation study, wasn't he?

A. That's -- no, he was on the -- he was in the Red Book.

Q. Oh, in the Red Book?

A. Yeah.
Q. Let's go first to page 10. So I've gone through this and calculated and you can do the same, if you like. I can give you a calculator but --
A. I've done these calculations. I know what you're going to show me.
Q. But if we're going current maximum and at the 1.15, the resistance there was 434. Would you agree with me that my arithmetic --
A. Sorry, which one? Heifers .5, 1.15 were below 500.
Q. Below 500. And 1.0?
A. Is 250.
Q. 250. And then the 3.0 is 304?
A. It's about a third so, yeah, somewhere in that.
Q. And then the 12.18 at 4 volts is 328 ohms?
A. Yeah.
Q. Then if we go down to the cows, I'm just going to read off those numbers for .5, it's 385. The 1.0 is 346. The 2.0 is 254 ohms. And the 4.0 is 331 ohms?
A. Mm-hmm.
Q. None of those animals are above 500, correct?
A. Yeah, these are one second measurements.

Yeah, that's correct.

Q. And so -- I mean, and anybody can do that just by doing the calculations for Ohm's Law. You can do it for the minimums, too?

A. Yeah.

Q. And when you get to the minimums, you have a few that are -- I guess the majority are over 500 but there's still some --

A. Yeah.

Q. -- that are less than 500 ohms?

A. Yeah, that's what it says.

Q. So I don't understand table 2. Can you explain that?

A. Well, that's looking at the ratio of animals with significant declines and it shows a broad pattern of declines in between week 2 and week 3 treatments.

Q. Week 2 was no voltage. Week 3, 4 and 5, they got voltage --

A. Yeah.

Q. -- right? And then they didn't get any voltage on 7 and 8?

A. Yeah, and that's just looking at the raw data.

Q. When it says zero out of 6, what does that even mean? There's six animals that got zero -- that

got zero treatment in week 3?

A. So zero, it says, out of 6 for -- at zero voltage the -- there were no significant differences. At 4 volts, for which half of them showed significant differences, and at the third week, again half of them showed significant differences in the zero treatment.

Q. What kind of threw me was this asterisk for 4 volts because it says it includes two animals which stopped drinking. I thought you told me that those numbers weren't included but now it's saying --

A. Yeah. So --

Q. -- they didn't drink anything.

MS. MERCER-LAWSON: Can you read back the question?

(Whereupon, the pending question was then read back by the Reporter.)

A. I -- so what we're saying is 1 and 4 showed -- let's forget about the two animals that didn't drink. Because within a day and a half of week 3, they were out of the study, because they didn't drink for a day and a half.

Let's just look at the first ones. One out of the four animals that were left showed a significant drop in the first week, three out of four in the second in week 4, and three out of four in week 5.

Then in parentheses after the one out of four is three out of six, because it's obvious that the two that were taken out of the study had signif -- would have significant difference in production.

Q. Okay, I got it.

A. I added those in. The numbers go up by two for each one of those because if we're going to look at those two that stopped drinking, they obviously had significant differences in milk production. So if we include those two, then we get the three out of six, five out of six, five out of six.

I put those in to include what was obvious in terms of those two cows were going to have production --

Q. It's you that did the asterisk thing?

A. Yeah. I put those in just to demonstrate that obviously not only one out of four but -- so there were two other ones that obviously would have had reduction in milk production even if we let them go onto drink most probably. So I have those in there just to highlight that they were part of the study that we could talk about in terms of milk production.

Q. So if I can go to figure 2B on page 12, please. So in the Water Consumption 0 Volts compared to Water Consumption All Animals All Voltages, there are

quite significant differences between 0 volts in terms of water consumption and all animals all voltages. Would you agree with me there?

A. So we're comparing week one, figure 2B with figure 2B. Is that your question?

Q. Well, all seven weeks are represented there, Dr. Aneshansley, for both charts and you can compare them however you want, but I don't see any of the all voltages animals ever returning to that level that they had in week 1. But maybe you can show me where that -- it doesn't appear to me to be true based upon that chart.

MS. MERCER-LAWSON: Form, compound.

A. No, and I think part of that is that adjustment period to the -- this includes that week 1, which we talked about, as an adjustment period.

Q. Sure, but the adjustment period for the zero volts was --

A. It doesn't show the same increase that were shown in the other ones.

Q. Right. So the animals that had zero volts never went down close to where the voltage animals went down to and in fact --

A. So the drop from week 1 to week 2 is not during a treatment period.

Q. I got it.
A. And if we take that as the -- a prediction of water consumption that stays -- the only thing significantly different from it is the week 1.
Q. No, all the rest of the weeks, it seems to me, are higher at zero volts than at --
A. The averages for weeks 2, 3 and 4 are lower than at week 1.
MS. MERCER-LAWSON: Form, argumentative.
Go ahead.
Q. I'm seeing week 2, 3 and 4 being averaged at somewhere around the 24 and a half gallon.
A. They're almost all the same average, hardly different.
Q. Week 2, 3 and 4 are below 23 and a half and 23 gallons. 2, 3 and 4?
A. These are different animals.
Q. Sure.
A. Okay? The week 2 --
Q. These are animals that got voltage and the other ones are animals that didn't?
A. That's right, and there's a difference between week 1 and week 2 in these animals.
Q. Sure.
A. And that was not a time they had

electricity.

Q. Correct.

A. So that was part of the argument of the adjustment period to the new stalls when they came in.

Q. I got it.

A. So now you compare week 2 across and it's pretty much consistent.

Q. It's not because zero voltage animals never went down after week 2?

MS. MERCER-LAWSON: Object to the form. Argumentative.

A. But they're not significantly different.

Q. Okay. They went down.

A. The averages went down, yeah --

Q. All voltages from week 2 --

A. -- but not significantly.

Q. Let me just finish my question. They went down in week 3, they were lower in week 4, and they went down in week 5, and they rebounded in week 6?

A. That's correct.

Q. Okay.

A. But none of those are significantly different from one another. These are -- one is -- they have to be separated -- well, they're not significantly different from one another.

Q. "Significantly" meaning in a statistical sense?

A. In a statistical sense. If you look at the variation and the means, these means are not significantly different.

Q. Okay. That's what -- you are saying that or are you saying the statistician told you that?

A. I can say that by looking at the way this data is plotted.

Q. Let's go to Delay To Drink 1 Gallon, which is on figure 3.

A. Got you.

Q. And you can see an increase in the delay from no treatment to .5, for 1 to 2, and then a big spike at 4.

A. Sure.

Q. And that's a trend. I mean --

A. Absolutely.

Q. So you were seeing significant differences between delay to drink a gallon between zero voltage and .5 in the voltage application; is that true?

A. There's no significant difference between those.

Q. But it's showing a trend upward?

A. It shows a larger value but there isn't

any -- if you compare what they drank -- the times at zero to the times at .5, there's no significant difference between them. There is a significant difference between zero and 1 volt, zero and 2 volts and zero and 4 volts, and that's pretty obvious from that. There's no overlap of these bars in any of these cases.

Q. Okay.

A. This is a good indication between a half a volt and a volt, there's some kind of sensitivity to that that caused their delay in drinking.

Q. Delay in drinking was due to the electricity?

A. Yeah. That's our assumption in that, yes. Not assumption. That's what the data shows.

Q. That's what you were out to figure out?

A. That's where -- this has nothing to do with production or data at all. This is a delay to drink.

Q. I got it.

A. This is solid data that says something about sensitivity of the cow between the half a volt, 1 volt, 2 volts and 4 volts.

Q. And a cow that is delaying for -- I think 1 volt is just around 200 minutes or is it a little bit north of that?

A. I'd have to go -- yeah, we can look at that. So it generally took -- so 200 minutes for a volt.

After two minutes it was a little bigger. There's a difference between 1 and 2, but when you got to 4 volts we're talking about an average value which is up about 850 or thereabouts, 850 minutes.

Q. And as high as 1,100 minutes?

A. And as high as 1,100 minutes.

Q. Okay. So you're saying -- I mean, I don't know if that roughly describes something that's kind of logarithmic in terms of --

A. It's typical. We've got a somewhat logarithmic scale at the bottom, .5 to 1 is a doubling, 1 to 2 is a doubling, 2 to 4 is a doubling.

Q. I got it. If we can move to the next chart, the Number Of Drinks at 0 volts and --

A. Yeah.

Q. -- and Drinking Time?

A. Yeah.

Q. So you have the same scales for the other animals, correct?

A. Same scales? I don't know what you mean by "scales."

Q. I mean, if I'm going to go to zero volts, number of drinks, all animals, and go to the next page, the number of animals at .5 volts, you're going to see --

A. The scales on the sides are all the same.
Q. The scales are the same?
A. I think so, all of these, yeah.
Q. What we have here for weeks 1 and 2 is that those animals --
A. Where are we looking?
Q. On page 14.
A. Okay.
Q. Number Of Drinks, All Animals, 0 volts.
A. Yeah.
Q. Those animals were not drinking as often as the .5 volts -- drinking less often than the .5 animals.
A. These are somewhere in the range of 40 and these are kind of -- yeah. In the control period they took a lot of drinks for some reason, much more than what we had in the control period for the zero and those are basically the same thing.
Q. And then the drinking time --
A. Drinking time was down and the drinking time is up for those zero -- time and number is kind of how much they drink. In the control period they weren't drinking -- the time that they drank was not as long as the zero and they drank more times. And during the control period, what we had was they took longer to drink but they drank fewer times in the treatment

period.

Q. Are you ascribing this then to just variations between cows?

A. No, I think that part of this is the adaptation to the treatments. They took longer drinks and less frequently under the treatments. That's what I would look at in terms of this, and when you came back to the amount of water that they drank, that was pretty even between what we saw.

This is -- I don't know what we can draw for it other than to see there are different strategies that one can use in terms of dealing with things that have -- that are perceived.

Q. Go to page 19, Milk Production.

A. Okay.

Q. Milk production for the cows with zero volts compared to the milk production for the cows at all voltages.

A. Page 19?

Q. Yeah.

A. So the second week, we have the little trend down.

Q. Both of them are trending down in the first two weeks?

A. Yeah.

Q. Both the zero volts --
A. But they tended to drink more during that week number 1, which might have something to do with the production for number 1. Again, looking at week 2 as compared, they've adjusted now.
Q. So if you eliminate week 1, the zero -- the zero volts cows started out at an average of something like 30 and a half kilograms and the --
A. 29. Well, week 1, they were 30 but we're going to neglect that.
Q. Yeah.
A. So they're at 29 and a half.
Q. 29 and a half and the no voltage cows were north of 31?
A. And the -- so these scales are the same, so the -- all the cows under voltage were at a little over 31.
Q. Right.
A. Yeah.
Q. Well, actually for the voltage cows they were over 32 -- or over 31. And the voltage cows continued to go down with some flip up in week 6?
A. Yeah.
Q. And they went down all the way to an average of something in the area of --

A. 28.
Q. -- approximately 28 kilograms and the no voltage cows were about 29 kilograms?
A. Yeah.
Q. The no voltage cows did better in terms of milk production at least compared to the all voltage cows, right?
A. Yeah, according to this data. That could be related to other things as well. Lactation period.
Q. It could be related to lactation period, sure. So I mean, the heifers, it's comparing the zero volts. They actually went up in week 2, continued to go up in week 3, and then started declining; whereas, the voltage cows went down in week 3 and continued to go down and then stabilized and went up a little bit in week 6 and 7 after the treatment was over?
A. But the variation in that all said that none of those were significantly different.
Q. Then let's go to figure 11 because this is the one that holds my interest.
A. Okay.
Q. And I think if I were to compare zero volt, starting at zero, that's the top line you see?
A. Yeah.
Q. And then the other lines are showing what's

happening over time with the voltage animals.

A. Yeah.

Q. That being the .5 volts, the 1 volt, 2 volts, and 4 volts, those lines are declining over time faster than the zero volt animals. Do you agree with that?

A. We didn't do any curve fitting on this but it -- you got some variations in the milk decline that are up and down.

Q. Sure, they are, but the voltage animals are holding their milk in this period where they're, you know, later lactation. Where they're expected to be going down, the voltage cows seem to be going down faster.

A. These declines would indicate that there's a difference between the zero and the 1. I don't know whether there's a significant -- whether that's significant or not. I can't tell from this.

Q. What I'm saying is that you're seeing a -- let me tell you how I interpret it and see if you agree. What we're seeing is that in later lactation than the normal lactation curve would be going down, the one with the voltage is going down faster, on average.

A. Well, we don't know what the lactation curves are, what -- okay. Give me that statement again.

MS. MERCER-LAWSON: Can you read it

back?

MR. BIRD: No, I'll restate it.

Q. I think the explanation you folks have given -- I think it's in the report but also in your testimony that you've given on this is that the production -- the animals that were tested had reductions in milk production, at least in part that was inspected -- expected because they were after peak milk?

A. Yes.

Q. And that's I think what you had testified to. Would you agree with that?

A. Yes.

Q. And what I'm saying is that with voltage, the production seems to be going down faster with the voltage than it does with zero volts, according to this graph?

MS. MERCER-LAWSON: Objection to form, vague.

A. According to this graph, yeah, but we don't know how the lactation curves are going down for each of these animals as well.

Q. What I'm saying is it wouldn't be truthful to interpret your study as saying there was no declines and no production according to voltage. The best that could be said is that there were declines in milk production

but they weren't statistically significant?

MS. MERCER-LAWSON: Object to the form.

A. I think that's what we said, isn't it? That's what the conclusions were.

Q. I've had people tell me and respected people tell me that this study stands for the proposition that there's no decline in milk production from 0 to 4 volts. Between zero volts and application of voltage --

MS. MERCER-LAWSON: There's no question pending.

Q. Okay. And I don't think that's a fair interpretation of this study and you agree with me on that?

MS. MERCER-LAWSON: Misstates prior testimony.

A. I think the conclusion we got from this was that one really needed to do more tests and that's what led us to the full lactation study.

Q. It was an inconclusive study as it relates to milk --

A. It wasn't particularly inconclusive. There are a lot of things that delayed drinking was a pretty strong, I think, conclusion that between .5 volts and 1 volt there was some sensitivity that the cows had to that, and that it continued further on up.

There also shows that -- the fact they didn't drink for long periods of time had an impact on -- an immediate impact on the significant -- significant changes in milk production and overall for the full three-week period, the -- there was no significant difference that we could see to the model that was used and -- but at the same time, the variation in all of this might have been the reason -- the variation that we got due to all these short-term changes may have been significant to keep us from seeing a significant overall change.

Q. Okay.

MS. MERCER-LAWSON: Would it be a good stopping point for a 5, 10 minute?

MR. BIRD: Let me finish this line.

BY MR. BIRD:

Q. I'm just looking at your graph here on figure 11.

A. Yeah.

Q. And it's telling me that the curve for the --

A. For volt 1 --

Q. For zero volts is above the rest of the line at the end of the day and that the others are below it and --

A. There's one that pops there above it.

Q. It pops up but then it goes back down again.
A. Which one was that? That was the -- I think that's the 2 volt one. That was the 1 volt.
MS. MERCER-LAWSON: What's the question, Counsel?
MR. BIRD: Pardon me?
MS. MERCER-LAWSON: Is there a question?
MR. BIRD: Yeah.
BY MR. BIRD:
Q. The question is simply that if I were to look at this graph without having some explanation about statistics and the power of the model to show anything or validity, that it looks to me like application of voltage makes things drop faster in late lactation --
MS. MERCER-LAWSON: Form, compound.
Q. -- agreed?
A. If that's the only thing you look at, the declines appear to be greater with voltage, but there are other factors that need to be taken into account in doing a statistical analysis of this.
Q. So it wouldn't be truthful to say you didn't see changes in milk production. You would have to say you didn't see changes in milk production that were statistically significant. The latter would be a truthful statement. The first one wouldn't?

MS. MERCER-LAWSON: Form, compound, asked and answered. Go ahead.

A. I think we're talking about long-term versus short-term.

Q. I'm talking about this study.

A. This study. With the model that we used -- that was used on it, it said there was no significant difference in milk production.

Q. Statistically?

A. Statistically significant, yes. Okay.

Q. The data in itself showed a decrease in production. It's just you didn't have the power to make it statistically significant.

A. That's a possibility.

Q. Well, that's the truth.

MS. MERCER-LAWSON: Form, argumentative.

A. I don't know whether that's the truth or not until we do -- until we do more experimentation.

Q. I'm just trying to describe what this study shows.

A. Okay.

Q. Standing alone, before you did your full lactation, it is something that if you were to look at it, that data would be concerning enough, because you're seeing those declines in production, that it caused you

and Professor Gorewit to say, we got to do something more long-term to sort this, and it wouldn't be truthful to report this as showing no reduction in milk; isn't that true?

MS. MERCER-LAWSON: Form, compound. Misstates prior testimony. Asked and answered. Go ahead.

A. Statistically it shows no significant difference in the production. It also shows wide variation and it shows that there's need for more numbers, but that this is a study that took a year-plus to do. Getting more numbers is always an issue so I think that's why we went to the full lactation study.

Q. All right. That's all I got. 624, I want to get this marked and identified.

(Exhibit 624, Transcript pages 2899-3292, PSC of Wisconsin hearing, 4/15/88, marked for identification, this date.)

Q. Do you recognize that this is the testimony that you and Professor Gorewit gave to the Public Service Commission of Wisconsin on April 15th of 1988?

A. That's what it says it is.

Q. You can flip through it and make sure it looks like what you recall.

A. I'm not sure what I recall from 1988.

Q. They called you both?
A. Yeah, I remember being there.
Q. This is a transcript from it that we've been provided.
A. Yeah.
Q. I asked you if this looks like the testimony you gave, you and Professor Gorewit gave?
MS. MERCER-LAWSON: Are you asking him to verify its completeness?
MR. BIRD: Pardon?
MS. MERCER-LAWSON: Are you asking him to verify its completeness?
MR. BIRD: I'm asking him to verify if that's what it is, start to finish. Go to the last page and see that they're done.
THE WITNESS: Are we talking now?
MS. MERCER-LAWSON: I think -- what's the question? I think it's a little vague.
A. I have a recollection of where the 10 and a half days come from. You add 10 and a half and 10 and a half and it comes to 21. That gives a comparative period to the 21 days of treatment.
Q. Sure. I understand.
A. So that's --
Q. Does that appear to be --

A. I see it has Aneshansley and Gorewit there. Appears to be the record.

Q. Okay. All right. I may not ask you any further questions on that. I just wanted to get that confirmed. I wanted to move to the second part --

A. What were you trying to get confirmed?

Q. That this is the transcript of the testimony you gave in 1988, and I think what you're saying is that it appears to be that testimony that you and Professor Gorewit gave, right?

MS. MERCER-LAWSON: Foundation.

A. It appears to be.

Q. Now we've marked 3035. That's 3035?

A. Yes.

Q. What exhibit is that?

A. 622.

Q. I want to ask you a couple questions about it. This is part of that same study and reports on some different findings.

A. Animal Health and Reproduction In Cattle.

Q. I think you told me that all the cows were healthy and didn't have clinical mastitis going in, correct?

A. If that's what this says, that would have been something that the animal scientist people took

care of. I didn't collect that data.

Q. A lot of the animals in the study became -- they showed clinical mastitis, correct?

A. I've got to look at this back here. I just was going to go back and look at the -- it shows number of clinical mastitis. So there were one in the pretest. 2, 4. There were 5 out of 14, it looks like there, and there were 2, 3, 4, 5, 6, 7, 8, 9, 10, 11. I don't know whether those are 11 different cows or if they're just -- they are certainly cases of mastitis.

Q. Well, this says there were 51 cows. I'm not sure -- let me just ask you a question here. I'm looking at page 8 -- page 2.

A. Page 2.

Q. Looking in the paragraph right before it says Statistical Analysis?

A. Yeah. (Witness reading.) Yeah, okay.

Q. It says: Milk samples from cows showing clinical mastitis were routinely cultured for bacterial identification and subsequent antibiotic sensitivity testing. Cows with mastitis were treated for four consecutive milkings with the appropriate antibiotic for the affecting organism. After this interval, their recovery was further evaluated. Those cows not responding completely were retreated until the clinical

signs were no longer present.

A. Okay.

Q. What does that mean they were "retreated"? Does that mean they were given more antibiotics?

A. Yeah, that would be my interpretation of that, but this is not part of what I was involved with doing. So I -- that's how I would read that; that they continued some kind of antibiotic treatment with that but I don't know that for a fact.

Q. Were they kept in the study?

A. Yeah. That would -- it's kind of indicated, I think -- they tracked them through the study.

Q. I think you have testified that -- well, first of all, one of the reasons for conducting the study was to determine whether or not cows that got electricity would get mastitis?

A. Well, that was part of this study, yeah. Part of this evaluation was to look at animal health, and animal health --

Q. But then you later testified that the set-up you had was a perfect storm for getting mastitis because they couldn't lay down like they would normally in a dry stall and had to lay down on the metal grate?

MS. MERCER-LAWSON: Form. Misstates prior testimony.

A. That is not part of what I was involved with the study. I mean, this is Gorewit's interpretation of the -- what happened in the study, okay? So I don't know what.

Q. But the point I'm making, if you're trying to study whether or not you get mastitis, you don't want to set it up so you create conditions to get mastitis --

MS. MERCER-LAWSON: Form, calls for an opinion outside the scope.

Q. -- correct?

A. I would --

Q. Well, can you answer that question?

A. I don't know that I can answer that. If you want to study mastitis, you might want to set it up so you have cases of mastitis. I don't know if that occurred here.

Q. You wouldn't -- however, healthy, which means when they entered --

A. Yeah.

Q. -- and that means they didn't have clinical mastitis?

A. Yeah.

Q. And then cows, when they were in the study, developed clinical mastitis, right?

A. Apparently, yes.

Q. And they developed clinical mastitis when they were on voltages?

A. Mm-hmm.

Q. But then the excuse for that was: Well, we set it up so they would get mastitis because this metal grate didn't let them lay down, and it was like, you know -- if you could set things up to create mastitis, this would be the way to do it?

MS. MERCER-LAWSON: Form, compound. Vague. Misstates prior testimony. Go ahead.

Q. Is that what happened?

MS. MERCER-LAWSON: Same objection.

A. I don't know that I could answer that question.

Q. Okay. Let me --

A. That's not part of what I was involved with in setting this up.

Q. All right. Let me just -- do you have that transcript in front of you?

A. Transcript. Which transcript?

Q. The one I just had you take a look at. That testimony, wherever that is. Right there. If you go to page 3127 --

A. Got it, I think.

Q. Are you there?

A. I'm there.

Q. And the question by one of these farmers was: And also you would agree that -- starting on line 10 -- as you just said, mastitis is mastitis, cows have it, so the record showed, and I'm sure you agree, then -- and do you agree, I'm sure -- or do you agree? That 27 percent of the cattle that went on your test had mastitis at the beginning or during the test period?

And Professor Gorewit said: I can't recall. I'd have to look at the paper.

Question: 10 out of 28 kind of comes out to 27 percent.

And Professor Gorewit said: That's what you read there.

Question: And, of course you have to agree --

Answer: May I make a comment?

And the Commissioner said -- the questioner said: Absolutely.

Commissioner Edgar said: Go ahead, absolutely.

And then the answer here starting on line 25, 3127: We are giving these cows these voltage treatments. The cow is standing on a metal grid. We use no bedding. It's probably the worst case scenario

with regard -- I mean, if mastitis is going to come up, it's going to come up. So they have to make electrical contact on that mat.

In other words, when they touch the nose to the pole, they're completing a circuit from the nose to the rear hooves. And in order for that circuit to be completed, we have to have contact resistance as low as possible.

A. They're all Gorewit.

Q. I know they're Gorewit. But that was his testimony; that somehow the presence of the metal grid without bedding increases the incidence of mastitis.

MS. MERCER-LAWSON: Misstates what the document says. Go ahead.

A. I'm not a mastitis expert.

Q. Okay. But this study concluded there were no adverse health effects, except that the incidence of mastitis went up, but according to you and Professor Gorewit, it went up because of the metal grid, not because of the voltages.

A. And that could be the truth. That is the truth according to --

Q. Professor Gorewit?

A. -- Professor Gorewit.

Q. But he's the guy that testified for years and

years in favor of utilities at numerous trials. You were aware he was doing that?

MS. MERCER-LAWSON: Form, argumentative.

A. At some point I was aware that he was doing that.

Q. Okay. The incidence of mastitis is laid out there on page 4 of 3035.

A. Page 4, yeah.

Q. Okay. I'm just pointing it out to you. I don't have any question about it. Going to Reproductive Performance on page 5, the first paragraph, it says: Two of the 10 heifers displayed normal reproductive cycles.

Do you see that statement?

A. Two of the ten heifers had normal reproductive cycles, okay.

Q. Does that mean 8 out of the 10 did not display normal reproductive cycles?

A. I don't know. I didn't monitor reproductive cycles. He says something about what the other two did right below that, didn't he?

Q. The third paragraph there: One cow out of 14 showed a normal reproductive cycle. This cow was in the zero volt treatment group. Three cows did not cycle. One was in the 1.0 volt group, two cows were in the 2.0

volt group. Two animals in the .5, one in the 1 volt, and one in the 4 volt group displayed irregular reproductive cycles, and one of the goals -- I read that correct, right?

A. Yes.

Q. One of the goals was to determine whether or not reproduction was affected by this short-term study. According to what you wrote there, there were some changes in reproduction but at the end it's reported that there were no changes statistically significant in reproduction.

MS. MERCER-LAWSON: What's the question?

Q. Is that what you reported out from this?

A. This is what -- all this reproductive stuff is what Gorewit reported on.

Q. Okay.

A. I didn't report this out in particular. I'm the one here because I set up the electrical stuff for the equipment. I'm not a animal physiologist.

Q. Okay. So that wasn't your part of this?

A. The evaluation of that was certainly not anything I had any influence over or did any collection of data, and those would be better questions for him.

Q. I know this has been marked before but it's the Red Book. I want to give you a copy and I don't

know what exhibit to call it. Do you know?

MS. MERCER-LAWSON: No, I don't.

MR. BIRD: I'm going to mark it again. I hate cluttering the record with paper but I have to do it.

(Exhibit 625, "Effects of Electrical Voltage/Current on Farm Animals", marked for identification, this date.)

BY MR. BIRD:

Q. Do you recognize this as the Red Book?

A. I recognize this as the agricultural handbook number 696, the Effects of Electricity, Voltage and Current on Farm Animals.

Q. The one question -- there's many questions I have about this but I just want to get it out of the way. I haven't seen any evidence that full lactation studies were referred to or relied upon in this book.

A. I thought I checked that. Maybe I misread. (Witness reading.) So on page 3-13, it says: Cornell University: Researchers exposed 40 cows in group of 10 (2nd to 5th lactation) to 0, 1, 2, or 4 volts for a full lactation.

Q. Is that a reference to the full lactation study?

A. I think it is.

Q. I didn't see it in the bibliography.
A. It may be in there simply because we're in the middle of it. It's not in the bibliography?
Q. No.
A. We may have done it and not finished analyzing the reporting of that.
Q. If you can see it in the bibliography -- I don't see it there, but you're saying what's on 3-13, that's a reference to it?
A. That's a reference to it. That's probably a reference because -- if it's not in the bibliography, we hadn't reported it. But we were in process. It was there, for the record. I don't see it. I don't see it either. Let me look. No, I don't see it in the bibliography.
Q. If I can go to page 3-14 --
A. Mm-hmm.
Q. -- there's a listing of some symptoms a farmer should look out for?
A. Yep.
Q. And on Behavior, it would be excessive or unusual nervousness in milking parlor or stall barn at milking?
A. Mm-hmm.
Q. It would include reluctance to enter and/or

eagerness to flee the milking parlor, correct?
A. Well, I'm -- you're jumping around.
Q. I'm just going to the next --
A. The next one, yeah, okay.
Q. They are italicized.
A. Yes.
Q. And up at the top of the next column: Increased frequency of defecation and/or urination in the milking parlor?
A. Yes.
Q. The last thing is reluctance to consume water or feed, correct?
A. Yeah. These are symptoms attributed to stray voltage.
Q. They're things you're telling farmers to look out for, based on observations?
A. I don't -- I'm not sure what we're -- these are certainly some things that have been reported.
Q. It says: The following are the most common symptoms reported in field observations.
MS. MERCER-LAWSON: What's the question?
A. Where does it say that?
Q. Do you see where it says Symptoms Attributed to Stray Voltage?
A. Yes.

Q. The sentence just before that.
A. Yeah, okay.
Q. So what you're reporting there is what the field observations are telling you and you're attempting to list those for people that are interested; that these are things you -- that -- field observations associated with stray voltage?
A. Yeah. This is what Gorewit is telling.
Q. It's not you; it's Gorewit?
A. Yeah.
Q. But you signed off on it?
A. I signed off on it, yeah. I --
Q. Gorewit, is he also telling you about the milking characteristics?
A. This is a section that he wrote and I think I've seen other literature that related to this, so milking characteristics is something that is his bailiwick. He's a lactation physiologist.
Q. Then he's saying: Poor milk let-down, incomplete milk-out, which in parentheses (leaving abnormal amounts of residual milk in one or more quarters) and increased milking time are common symptoms noted by dairy farmers having stray voltage/current problems, right?
A. That's what it says.

Q. Then in the -- I'm just going to talk to you about the italicized paragraphs that follow. These things are poor milk let-down or incomplete or uneven milk-out, right?

A. Yeah.

Q. Increased milking time?

A. Yeah.

Q. Production performance?

A. Mm-hmm.

Q. You have to answer out loud and say yes.

A. Yes, sorry.

Q. Increased somatic cell count and incidence of clinical mastitis?

A. Yes.

Q. Lowered milk production?

A. Yes.

Q. Now, this is the chapter that you and Professor Gorewit wrote?

A. Yes.

Q. According to you, it has continued validity to date and is trusted by scientists in the field, right?

A. I think that they are reported. This says the things that have been reported and these are symptoms attributed to stray voltage, and I think that's

still happening, but I'm not sure what this is -- this is a report of problems that people think they have.

Q. Sure, but, I mean, it's things that they're based upon observations in the field?

A. I'm sure people -- yeah.

Q. Okay. So now I want to just go real quickly to the figure 3-4 on 3-22. Where you have the line, that dotted line that goes at an angle --

A. Yeah.

Q. -- is there some kind of -- is that just like an absolute line or are you indicating that's sort of a generalized belief; you can have some losses before or above?

A. We were trying to come up with a representation of how we might show what was known at that particular point in time, and my contribution to it was the -- basically the behavioral response and milk production response, current and voltage being the general axes, and then we set the -- the whole group sat down and tried to figure out a way to put it in that form, and this is what we ended up with.

Q. Okay. Well, I was trying to figure out, what did you put in there? I mean, you know --

A. What did I put in there? This was a consolidation of what the whole group put together as a

product in terms of how we're going to break up behavioral response.

Q. If I were to go to a farmer and say, hey, you got 4 milliamps --

A. Okay.

Q. -- and the behavioral response was perception only --

A. No, 4 milliamps would go out to that line and you'd be in the moderate area.

Q. 1 milliamps is in the moderate area. That's moderate for behavioral and if I had -- if I was a farmer and I had 7 milliamps but didn't have severe behavioral response, then I wouldn't have a problem. I wouldn't have any production loss.

MS. MERCER-LAWSON: Form, compound. I need to get my objection in. Form, compound, vague. Go ahead, Doctor.

A. Well, I have to remember how this is interpreted. So the line that comes down and hits that dotted line there on the None -- let's just figure out how do you interpret this again? So one would expect up to 1 milliamp here, that there was no behavioral response. And from 1 to 3, Perception Only.

So where those two lines connected to the dotted line give you the range of -- tell you what the

current is and what people thought were the perception levels.

Q. So right on the next page you're writing that Norell found behavioral problems at 1 milliamp and then on this chart it says that 1 milliamp, you can't get --

A. It says it can be perceived.

Q. Okay.

A. I can go back and look at Norell again.

Q. So go to page 3-23 and go up to the right-hand column.

A. Okay.

Q. And it starts at actually the bottom on the left-hand column: Minnesota researchers found --

A. 323?

Q. 323, bottom: Minnesota researchers found that mouth opening is a specific, current-elicited response for the mouth-to-all-hooves pathway. No responses were observed during control (no current) trials; specific avoidance responses were exhibited, 13.8 percent of the time at 1 milliamp of current, 30 percent of the time at 2 milliamps, 92.3 percent of the time at 4 milliamps, and 98.4 percent of the time at 5 milliamps.

How does that statement there square with your chart there? I can't fit what's written on 323

into your milk production chart.

A. I have to go back and look at what the avoidance response was exhibited.

Q. See, the problem is lawyers, when they're looking at this, this chart right here, they're saying, look, if you're below the line, nothing happens, and that's what utilities are telling their customers when they --

A. It doesn't say nothing happened. It says there's perception, and perception could be detected by an avoidance behavior. So those are the kind of behavioral responses you look at from perception.

Q. You're not going to get any loss of production up to --

A. This study didn't show any milking response. It just showed an avoidance response.

Q. Okay.

A. Turned its head.

Q. That means the cow --

MS. MERCER-LAWSON: Were you finished? Go ahead.

A. Had a behavioral response that wouldn't impact a -- our interpretation of that as a group was no loss of production would be anticipated in that even though there was an avoidance behavior.

Q. Right.
A. So it's a perception. So between 1 and 3, I think this jives with what we have in this -- on this chart.
Q. All right. So what I'm trying to say, avoidance response for 13.8 percent of the animals -- if they're avoiding the water --
A. It doesn't say they're avoiding water. It says avoidance response.
Q. What are they avoiding?
A. I'd have to go back and look at his experiment. It was a feeding type of experiment.
Q. They're avoiding the current, right?
A. Yeah, they're perceiving the current and they're avoiding it.
Q. And if the --
MS. MERCER-LAWSON: Were you finished?
A. Current.
Q. If the current happened to be in the water, then that would mean they're avoiding the water?
MS. MERCER-LAWSON: Form.
A. We just showed you data where there was current in the water and they didn't avoid the water. There were currents well over a milliamp, well over the 3 milliamps where they didn't avoid the water.

Q. Some did, some didn't?
A. All of them. In the end they didn't. It's only when we got to 4 volts, that we got --
Q. Okay. All right.
A. I mean --
MS. MERCER-LAWSON: You got to let him finish his answer. Go on.
Q. Are you talking about the water bowl test that we just went through for an hour?
A. Yes.
Q. I think your testimony on that is sufficient at this point. Let me just move on.
I -- is there any other basis for creating that chart? What specific research were you relying upon in creating that chart?
A. This chart was created by the entire group and they relied on all the research that they had done, research that other people had done, and this was a consensus of what we thought was a good chart to represent that.
Q. I'm trying to find out if there were specific scientific studies that were relied upon in creating that chart?
A. Sure, and I'm sure Norell was one of them. Gustafson and Appleman were part of this. Norell was a

student of Appleman -- of Gustafson. He knew about that research. He agreed with this particular chart. There were other people that had done experiments along the line. The whole group did experiments. They're listed in this chapter -- for this chapter.

Q. Can you tell me which ones they are by looking at the bibliography? They're not --

A. I don't know if I can or not. I'm not -- I can't tell you exactly which -- people had opinions about this and agreed to this based upon their background, their knowledge of the research that had been done, and this was where -- this is where we came out.

Q. Who wrote it? Who drew it?

A. All of us.

Q. Did you?

A. There was a blackboard there we put up and there was a conversation amongst the whole group as to how we should draw these lines.

Q. Somebody went up, this on this axis, and then we're going to draw this line, and everyone nodded and said yes?

A. Not quite. There was more discussion that I recall. This is how many years ago?

Q. Was this in Minneapolis that you did that?

A. What?
Q. Minneapolis?
A. This was in our first meeting at Cornell --
Q. Okay.
A. -- we started to put this stuff together like that.
Q. That chart got created at the first meeting?
A. I'm not sure when we finalized it but it got created at the first meeting, and we may have gone back to it a few times to make adjustments and what have you.
Q. If you can go to the preface that Lefcourt did?
A. In the beginning of this?
Q. Yeah. It's right at the beginning in the preface.
A. On the back of the Red?
Q. No. Turn over a couple more pages. Right there. It says in the first paragraph, about halfway down, it says: For these reasons we met at Cornell in May of '88 -- May of '88 to review our opinions and concerns and to discuss the possibility of publishing a white paper on stray voltage. At this meeting we concluded there was an excellent possibility that a consensus could be reached and a second meeting was scheduled for October in Minneapolis.

A. Okay.

Q. And I think what you told me before, earlier today was that the whole idea of doing the white paper actually came up at an ASAE conference amongst the electrical engineering folks. Is that true?

A. That's my understanding. David Ludington, Bob Gustafson, other people who were doing stuff on rural electricity and other things, threw that idea out. That was my understanding of how -- the genesis of the whole process.

Q. Then you met in -- this was in May of '88. You had that first meeting and then the second meeting was October of '88 in Minneapolis?

A. Mm-hmm.

Q. You're saying it was at this first meeting that somebody got up on a blackboard and people were talking and somebody created the X and Y axis and that's how the whole chart --

A. That was the beginning of that chart; okay? I'm positive of that because I'm the one who put the thing on the blackboard with the squares and the labels and what have you.

Q. You're the one that did that?

A. I did the outline of the chart; okay?

Q. Okay.

A. This is how we can show behavior. This is how we show milk production, current, voltage. How do we put this together to make a diagram which describes the state of the world in stray voltage at this point?

Q. In terms of -- what I'm not seeing on there is any evidence of a bell-shaped curve of what we can expect. You have a sharp line that just divides it.

A. Yeah.

Q. And if you're above or below, that's -- you're doomed with recovering anything, if you're below that sharp line that you drew on the board. This isn't intended --

A. No.

MS. MERCER-LAWSON: I got to object to the form. This is vague, compound, more of a conversation than a question and misstates testimony.

Q. Go to the chart on 3-22 or 22. Got it?

A. Yeah. 3-22, right with the chart.

Q. Yeah. I see a line that runs diagonally from zero in the lower left-hand corner all the way up --

A. It's a diagonal across the graph.

Q. What is that line intended to be?

A. That gives us a point -- bring a line down from the top or up from the bottom to indicate where

milk production -- so we got a milk production response. We would expect no loss -- the comment was no loss in production anticipated, and that goes up to the 4 milliamp line. You get above that, it says: Any loss of production may not be due to changes -- any loss of production is not due to any changes in animals. Production, and you get up to the 6 milliamp line: Production losses may be due to changes in the animal.

Q. Okay. But you can have production losses due to stray voltage but no change in the animals?

MS. MERCER-LAWSON: Object to the form, vague.

A. Above that it says they're severe change in behavioral response.

Q. Okay. Maybe -- I just want to know where the words are written, any loss in production is not due to change in animals? Do you see where those words are written?

A. Yeah.

Q. That's below the dotted line?

A. It's below the dotted line.

Q. Does that mean that a farmer could experience loss of production from stray voltage but it wouldn't be due to change in the animals?

MS. MERCER-LAWSON: Could you read the

question back?

(Whereupon, the pending question was then read back by the Reporter.)

A. I think what that means is production loss may be due to change in the animal. So if you get to that level, you've changed the behavior of the animals with the electricity such that that will produce a loss in production. It won't drink. It won't eat, whatever, and that's a severe behavioral response.

Q. I'm not in that box. I'm in the one just to the left of it where it says: Any loss in production is not due to change in animals.

A. Yeah. I think that is where we're at the moderate level and the loss in production would not be due to a behavioral change from the animal.

Q. But they still could have loss of production there, correct?

A. Yes.

Q. Okay. If they had loss of production --

A. That relates to the behavioral response being significant enough to cause problems with a variety of problems associated with how production can go down because you can't deal with the animals.

Q. So at that -- in that -- where the printing exists, are you and I on the same page? I'm talking

about where it says: Any loss in production is not due to the change in the animals.

A. Yes.

Q. Just focus on that for purposes of the question. Can there be production losses due to stray voltage where that --

A. Yes.

Q. All right. Now, if you just get into -- if you go a little bit to the right of that, it says: No loss in production anticipated.

In that particular area, can you have any losses from stray voltage according to this chart?

A. According to this chart it says no loss in production anticipated.

Q. It says it's not but, I mean, if it happens -- if there's a loss of production, even though it's not anticipated, can there be a loss in production from stray voltage?

A. What the chart says is there is not a loss in stray voltage, not a loss in production due to stray voltage.

Q. That's what that --

A. That is what that's supposed to mean.

Q. That's what that means, correct?

A. Yes.

Q. And so that vertical line which is some gradation of moderate response is an absolute bar in proving anything with stray voltage; is that right?

MS. MERCER-LAWSON: I'm going to object to the form and terminology.

Q. Do you understand what I'm saying?

A. I understand what you're saying and I think we got to look at what the purpose of this was, is to give a guideline of where -- what we were being told by the data that was there at this point in time, and I don't know that it's a definitive thing.

You talk about a bell curve. We could have made this much more complicated. We were trying to make it simple and give some guidelines.

Q. Nothing is simple for us lawyers. We see those lines --

A. Well, we tried. I mean, I don't think there was anything that was -- these were all estimates based upon the best that we could come up with.

Q. You knew this was going to be showed to juries.

MS. MERCER-LAWSON: Object to the form, argumentative, misstates facts.

A. I don't know that.

Q. Let's go back to the preface then. And you

guys wrote this in response to litigation.

A. No.

MS. MERCER-LAWSON: Misstates testimony.

A. That's not true.

Q. Okay.

A. We wrote this as a guide to people that were involved in this and what the data was showing, as best we could interpret it, as to where you start -- to start take action with respect to stray voltage.

Q. Okay.

A. Some people would like to have zero current on the -- available, zero neutral-to-earth voltage. This is a handbook.

Q. You go to the top of the preface: There were two primary reasons for publishing this handbook. First, we, as scientists, were distressed that our research results were being misinterpreted and misconstrued in media and in courtrooms; correct?

A. That's what it says, yes. I wasn't disturbed by that but, yeah. Okay.

Q. So when the Red Book came out -- and by the way, let's go to the bibliography. If you can go to the back of that?

A. Yeah.

Q. Go to page 8-2.

A. Yeah.
Q. I'm counting -- I'm looking at under G.R. Bodman, one, two, three, four, five articles by him and others that were quoted in the bibliography?
A. Mm-hmm.
Q. So and you know Gerry Bodman?
A. Yeah. I knew Gerry. I met him. I don't know that I know him.
Q. Well --
A. I know who he is.
Q. You testified in the cage trial, I think we already talked about that, and he was on the other side?
A. Could be. I don't remember.
Q. I think you recognize that there are reasonable, competent scientists that differed with your opinions as it related to the Red Book, correct?
MS. MERCER-LAWSON: Could you read the question back?
(Whereupon, the pending question was then read back by the Reporter.)
A. There are other scientists that disagreed with the conclusions of some of the Red Book, yeah.
Q. And they were -- there are scientists out there that you would respect as having credible reputations but simply disagreed with the conclusions of

the Red Book, correct?

A. Yeah.

Q. And Mr. Bodman was one of them?

A. Yes.

(Exhibit 626, 3/28/94 letter, Gustafson to Lefcourt, marked for identification, this date.)

A. I would just note that the Bodman articles are all extension type articles. They aren't peer-reviewed.

Q. No, but if you see 626, it's Dr. Gustafson running by, you know, some of the authors of the -- on the Red Book a response to Gerry Bodman's comments about the Red Book; true?

A. Yes.

Q. Do you recall that controversy?

A. Yes, I do.

Q. And so that means you must have read the comments on stray voltage technical issues before you gave your approval to Professor Gustafson to send out that letter?

MS. MERCER-LAWSON: Form, assumes facts. Go ahead.

A. Yes.

(Exhibit 627, "Comments on Stray Voltage

Technical Issues", 6/22/92 by Bodman, marked for identification, this date.)

Q. And do you recognize 627 as being the comments of Mr. Bodman to the Minnesota Department of Public Service that refers to -- that was discussed by Dr. Gustafson in his letter back to the Public Service or Minnesota Public Utilities Commission and which you approved? You approved Gustafson's letter back, right?

A. Yeah, I contributed to it in some fashion.

Q. And then what he was responding to was this Exhibit --

A. Yeah.

Q. -- 627? So you must have read the comments by Gerald Bodman, who's an author quoted six times in the Red Book, in the bibliography that discussed the USDA study, correct?

A. Yes.

Q. And the first page, he's saying the recent publication by the United States Department of Agriculture, handbook 696, was mentioned in the Minnesota PUC notice. So he was responding to that?

A. Yeah.

Q. And so you -- did you look at that and talk to Dr. Gustafson and the others about Gerry Bodman's comments?

A. I don't recall how all of the communications went around that but we simply decided we knew to make a response to it.

Q. Okay. All right. Did you, yourself, did you create any kind of detailed response to this statement that Mr. Bodman gave to the Minnesota Department of whatever it is, Public Utilities Commission? Did you do anything on your own to take a look at that or provide a response?

A. I looked at it to provide a response to Gustafson.

Q. Did you write anything to him or did you talk to him on the phone?

A. I don't recall.

Q. And then in response to that, Mr. Bodman responded to Dr. Gustafson. Are you aware of that?

A. I don't know that I ever saw his response. I may have. This is back when, 1994?

(Exhibit 628, 4/6/94 letter, Bodman to Gustafson, marked for identification, this date.)

Q. Have you seen that before?

A. I don't know.

Q. That doesn't ring a bell for you?

A. Doesn't ring any particular bells for me but

there's a lot of material that goes across my desk, has over the years. May have seen it, may not have seen it. May not have responded to it. I don't recall.

MS. MERCER-LAWSON: Want to go ahead and read it then?

THE WITNESS: Sure. (Witness complies.)

BY MR. BIRD:

Q. Does that refresh your memory?

A. No. This is the first time I've seen this.

Q. Is it true that the videotape that was taken of the animals that showed such violent reactions that the Research Institute's legal counsel advised that the videotape be destroyed? Do you recall that?

MS. MERCER-LAWSON: Can you point to what you're talking about?

MR. BIRD: Page 2, item 3.

A. This letter to Gustafson.

Q. Page 2. It says 2 at the bottom of the page. You're on page 1. It's this page here -- are you actually not following?

A. This is page 1, page 2.

MS. MERCER-LAWSON: Looking at Exhibit 628, a letter to Gustafson dated able April 6, page 3 is something very different.

A. Are you looking at the technical contents?

Q. I'm looking at something different, my mistake. Let me finish this as long as you've got that. Is it true on the comments that there was this -- a violent reaction from the two animals?

A. Page 2? So it says: Each of the two studies reported in USDA publications began with at least two additional cows. In each instance, at least two animals reacted.

So I don't know what two studies is he talking about? Is that outlined?

Q. Listen, let me go onto another question.

A. I can tell you there were not violent reactions from -- if you're referring to the two cows in the study that we've been talking about, there was no violent reaction.

Q. Was there ever an instance where a videotape showed a violent reaction?

A. I have no recollection of a videotape.

Q. Okay. So he states, and I'm talking about this letter you just read now, the one of April 6th, 1994?

A. Gustafson?

Q. Yeah, Gustafson, on page 2, and according to LaVerne Stetson, it says: The graph is supposed to represent a trend line of animal response that suggests

that the line was fitted to the available data. Is that true?

MS. MERCER-LAWSON: I'm going to object to the form, vague.

Q. Are you having trouble finding it?

A. I'm having trouble finding where you're talking about. Second paragraph?

Q. No.

A. Where are we talking about?

Q. Right here.

A. Since the graph is supposed to represent a trend line of animal response suggests a line was fitted to available data.

Q. Is that true?

MS. MERCER-LAWSON: Object to the form, vague.

A. No.

Q. You did not try to fit the data to the line?

A. Yeah, we tried to do it to fit the data to the line but we didn't do a trend volume. We didn't do an analysis -- we didn't do a linear regression analysis on a bunch of data.

Q. So you didn't assemble the data and attempt to interpret it from a statistical standpoint?

A. That's correct.

Q. You just realized or looked at the studies and came up with this?

A. We looked at the studies that had shown significant differences and --

Q. And then did you believe that there would be a standard deviation from this? In other words, if the thing could fall on either side of that line, that either might be troubling or might not be troubling based upon the way you had written the line?

MS. MERCER-LAWSON: Object to the form. Vague in terms of terminology, assumes facts not in evidence. Go ahead.

A. In my opinion they're to provide some guidelines.

Q. Not a hard and fast --

A. Not a hard and fast rule.

Q. Okay. So got some new exhibits here I wanted to ask you some questions about.

MS. MERCER-LAWSON: Do you need a quick break?

THE WITNESS: I'm okay.

MS. MERCER-LAWSON: Are you sure?

Q. So let's go to 3502. I'm going to give you all of these at once, 3503 and 3504 -- not 3504. I didn't give you the exhibit. I'm kind of getting weary

myself. It's Exhibit 629 which is 93-502, ASAE. 630, which is 95-303, and then the third thing I'm giving you is Exhibit 631, which is the Journal of Dairy Science article having to do with health and reproduction. And there's another one.

(Exhibit 629, 90-3502, "Milk Production With Voltage Exposure During Entire Lactation", marked for identification, this date.)

(Exhibit 630, 90-3503, "Holsteins' Reproductive Performance During Long-Term Voltage Exposure, marked for identification, this date.)

(Exhibit 631, "Effects of Voltages on Cows over a Complete Lactation. 2. Health and Reproduction, marked for identification, this date.)

(Exhibit 632, "Effects of Voltages on Cows over a Complete Lactation. 1. Milk Yield and Composition," marked for identification, this date.)

BY MR. BIRD:

Q. Let me just hold onto those for a second because I want to exhibit them to you. The ASAE papers at 629 and 630 correspond to the Journal of Dairy

Science articles -- which one is Health and Reproduction?

A. 35 -- 630 is Reproductive Performance.

Q. So this -- what I'm trying to say is 629 goes with the 632 and 630 goes with 631?

A. Okay.

Q. It's all the same, full lactation study for all four of these, right?

A. Yeah.

Q. Okay.

A. Yeah.

Q. And what you're doing is reporting it out first in the ASAE publication and second in the Journal of Dairy Science?

A. That's typically how we did things.

Q. Now, how many cows actually went through the test, either full or partial lactation?

A. I don't understand your question. How many cows were there in the study?

Q. I want to know how many cows were part of the testing that was done --

A. There were a large number of cows that were part of this.

Q. A whole bunch of them, way more than 40?

A. Way more than 40 cows, so -- and the reason

for that is that this study was probably over two and a half years in the making. There was a criteria for the cows. And so as cows came up, we could begin to fill pens up for the treatments, and we always put other cows into that -- we always kept ten cows in each of the pens.

So if we got three cows that we could use for the 40, they went into the treatment -- into the treatment pen and there were seven other cows that were put in there with them.

Q. And the data was --

A. And once you got done with the cow -- there was always ten cows in each of the pens throughout the whole -- and the pens weren't all started out all at the same time. So there were -- I don't know whether we kept track of them, whether we had the -- I don't know the number off the top of my head, how many cows were used.

Q. Well, there were hundreds, wasn't there?

A. I don't know. I just -- it could be.

Q. How many cows actually -- I'm talking about individual cows now, actually went through a full lactation?

A. Probably 40. The rest of them were just cows that came in -- that went in and out, that didn't

come in at the beginning of the lactation. Just they were there to be in the pen with them, and if they went dry, then another cow was put in with it.

Q. All right.

A. In that pen.

Q. Let's say a cow went -- was a cow that you were doing the experiment on and that a month later it died. Was that data reported?

A. I don't know that there were any of the 40 cows that died --

Q. I'm just asking --

A. -- or replaced.

Q. Cows get sick?

A. Yeah, but I think we were able to get the 40 cows that we had through this -- we would have reported it.

Q. I'm just trying to understand what you did. You said you got 40 cows and you're saying you filled one pen with ten cows.

A. No. We started to put 40 cows that we were looking for that have just given birth. So whatever period of time, we waited until we could start the study on that. The criteria that says, okay, cow gives birth. At some point after that, it can come into the study.

So if we only got one cow, we put it into

the pen. We put nine cows in there with it from out of the herd; okay? We weren't keeping record of those nine cows. We only kept records on the cow that was just starting its lactation.

Q. And what if that cow didn't make it to the full lactation?

A. I think it made it. They all made it to the end.

Q. Every cow you picked made it to the full --

A. That's my recollection. I'd have to come back and read the papers to see. I do remember we did have a couple of the replacement -- the replacement cow, cows that weren't part of the study that came in that didn't drink water for a day and a half or for part of a day, because we could tell that from the milk production stuff that we had to replace, but I think those are the only two that we had to remove from the cow population.

None of the 40 -- I think all 40 went through but that's just my recollection right now.

Q. You're saying the data for those animals that were just in there was not kept?

A. Yeah, it was data kept.

Q. But it was not reported on as part of the study?

A. Well, we did -- the data on the replacement

cows? I don't know that we kept data on the replacement cows because sometimes they were in and out.

Q. When you started this study, was there one cow?

A. There was probably more than one cow that we got but not very many more, but there was probably one or two. I don't remember exactly.

Q. Are you telling me that you got a cow; you waited 7 to 10 days to make sure it was free of any metabolic problems, correct?

A. I have to remind myself of all that.

Q. What was your definition of a full lactation?

A. Full lactation was until it was dried off.

Q. Which could be how long?

MS. MERCER-LAWSON: Form. Calls for speculation, outside the scope.

A. That was determined by the procedure that LARTU used to dry cows off. I don't know what that was.

Q. Were there some cows 250 days?

A. The data should be here on the number of days in lactation that each of the cows that were in the study were.

MS. MERCER-LAWSON: Would it help you to read the study?

MR. BIRD: I'm not going to have him

read the study.

MS. MERCER-LAWSON: You're asking questions about it.

MR. BIRD: I understand, sure. But good move.

BY MR. BIRD:

Q. I'm just asking you a question. If you don't remember, you can tell me you don't remember.

A. Yeah. I'm telling you what I remember.

Q. Okay. So the way it worked was you would begin this experiment with a single pen and you would put one or two cows in it?

A. Put whatever cows you could get in a point in time into that pen, and it may have been two or three days, whatever, and then there were another set. If there were three cows like that, there were another seven cows that could be put in the pen with it. We had the ten cows.

Q. Then there were comfort stalls?

A. Yes. As I remember, there were comfort stalls.

Q. The comfort stalls there were on both sides of where the water was and the cow could access the water on either side?

A. The water was at the end of the set of

comfort stalls, as I recall, and they could -- only one at a time could access it.

Q. And did cows become sick and were taken out of the study that were part of the experiment?

A. I can't answer that. I don't recall.

Q. If the cows were sick --

A. If we had sick cows, they would have been taken out of the study.

Q. Then they would be replaced?

A. If the sick cow was one of the 40 cows?

Q. Yes.

A. They would have been replaced but I don't recall that we had to do that.

Q. But if that happened, they would be replaced. You're saying you don't recall. Is there something out there, some data out there that's going to answer that question?

A. It should be in the report.

Q. Okay. Go to the 93-502. That's the one that reported on production?

A. Okay.

Q. What Exhibit number is that?

A. 629.

Q. So we're talking about 629. So that none of the authors is a statistician, correct?

A. No.
Q. But you got some help from somebody by the name of Bert Klei?
A. Yes.
Q. Do you know who that is?
A. That was a statistician in Animal Science.
Q. It says: One group of ten Holstein cows was not exposed to voltage, while three other groups of ten cows were exposed to 1, 2 or 4 volts at the water.
MS. MERCER-LAWSON: What page are you on?
MR. BIRD: In the summary page on 1.
A. Okay.
Q. What you're saying is -- and you're talking about groups. That's the 10 Holstein cows over the whole two-year period; you're calling that a group that had zero volts. Then there would be another group --
A. The group -- I think we just went 0, 1, 2, and 4, and so the first ten cows that we had went into the zero group.
Q. Okay. So --
A. But they came in sequentially and -- but at all times there were ten cows in there.
Q. That's what I'm trying to figure out. So you decided you're going to do zero volts with the first ten

cows.

A. I think that's what we did, yeah.

Q. Let's say the first day of the whole experiment you had maybe two cows that fit your criteria?

A. Yeah.

Q. What you're saying is that you put in eight other cows in one part of the experiment just to fill up the pen?

A. Just to make sure we always had ten cows in the pen.

Q. Then if you got a third cow --

A. One of the replacement cows came out, we put it in.

Q. So then gradually as time went on --

A. Time went on --

Q. As time went on, you had more and more treatment cows in the pen until you had it full with ten cows --

A. That's correct.

Q. -- that were all getting treatment, and then as time went on, after that it would gradually get reduced?

A. They would, yeah.

Q. And did you have another pen existing at the

same time with 1 volt?

A. Once we got the ten into the zero, we started on the next one, doing the same thing.

Q. So that's what I was trying to figure out.

A. And so when we got the 11th cow in the study, it went into the 1 volt pen and another nine went with it, and then we got another one that fit the criteria, it would come in and one of the replacement cows would go out until eventually we fill it up, and then the reverse process takes place; that the cow that went through full lactation, it would come out and a replacement cow would go in.

Q. This would be over the period of several seasons? Several years?

A. Two and a half years, as I remember, or something like that.

Q. Did you have four pens --

A. We had four pens.

Q. -- that were identical?

A. There were four pens that were identical in terms of the layout of the water and the -- I have to go back and check that. I'm not sure they were identical.

Q. Can you go to figure 1?

MS. MERCER-LAWSON: Were you finished with your answer?

THE WITNESS: Yes.

Q. Figure 1.

A. Yeah.

Q. It says here you have comfort stalls for all ten cows?

A. I believe that was the case.

Q. I counted the stalls in the diagram and there looks like there's nine. Is that just a bad diagram?

A. Could be a bad diagram. Probably a bad diagram.

Q. I see nine in the diagram. There was ten?

A. There's ten there if you count the one, the grain -- that's grain. Could be a bad diagram.

MS. MERCER-LAWSON: Can you point on the paper where it says there's ten stalls?

MR. BIRD: Page 2: Each pen contained ten elevated comfort stalls, (figure 1.)

MS. MERCER-LAWSON: Thank you.

A. I'm pretty sure we had a comfort stall for each of the pens.

BY MR. BIRD:

Q. Are you the one that drew that diagram or blame that one on Gorewit?

A. I'm not going to blame it on anybody. My understanding is we had -- and my recollection is we had

a comfort stall for each cow in each of the pens.

Q. And then the second to fifth lactation cows, there were no heifers?

A. Yes.

Q. And treatment was delayed for seven to ten days to make sure that the animals were free of any health-related issues, specifically including metabolic problems?

MS. MERCER-LAWSON: Can you read the pending question?

A. Was that a question?

Q. Yes. I'm asking you if that's what you did.

A. That was a protocol for the test -- for the animal scientists, yeah.

Q. It's described on page 3 on the Animals.

A. That's what we did.

Q. The criteria for selection were that the cows had (A) to be healthy, have just calved and be free of metabolic calving disorders; (B) to be free of major health problems during previous lactations; (C), to be free of recurring health problems such as mastitis and lameness; and (D), to have been open (not pregnant) less than 120 days in previous lactation; (E), to have a peak milk of more than 27 kilograms and a total milk production of more than 6,350 kilograms during the

previous lactation; and (F), to not have been subjected to voltage in any previous stray voltage experiment?

A. That sounds right. This is all stuff that was done on the Animal Science side.

Q. You said the study lasted about two and a half years?

A. That's kind of what I remember.

Q. It took five months for 40 cows to calve and meet the criteria, correct?

A. Yeah.

Q. If you have those pens full with 40 cows after five months, that study could have been done, on average, about 305 days from then. So that doesn't compute. Do you agree?

A. That doesn't compute, that's right. So maybe I'm not remembering that correctly.

Q. Because, on average, cows are going to lactate for 305 days; true?

A. Yeah.

Q. And five months is 150 days, which is -- when you add them together, is way less than two and a half years. So something happened.

A. That's how long it took them to get 40 in, plus you have another 305 days from there as well. So it's over a year I guess.

Q. But you told me numerous times --
A. Yeah, I did because I thought it was that. Maybe I'm --
Q. So what that means, that some of these treatment cows were taken out and replaced; isn't that true?
A. No. It just means that I didn't calculate the two and a half years right.
Q. So what you were looking for at item E is they have a milking of more than 27 kilograms and that's -- peak milk of 60 pounds, 27 times 2.2?
MS. MERCER-LAWSON: Are you asking him the math question?
MR. BIRD: Yes.
A. Well, 2.7 is 54 plus another 5, so it's about 6 pounds.
Q. That's what I said. That's not a very significant peak and those would be low producing cows in terms of if that was your minimum, correct?
MS. MERCER-LAWSON: Form, calls for an opinion outside the scope of qualifications. He's not a milk production expert. Go ahead.
A. Yeah, I --
Q. Right?
MS. MERCER-LAWSON: Same objection.

A. Again, I'm not the milk production person here.

Q. Okay.

A. I would say it sounds not like the maximum, 100 pounds, so it's not a high producing value, but that was a minimum.

Q. Go to page 4, top of page 4, and I'm going to read from there: When an experimental cow got mastitis, she was removed from the experimental pen and placed with other mastitic herd cows, and the number of cows in a pen was reduced by one. Also, the waterer for any mastitic cows was not connected to any voltage.

So you did have mastitic cows.

A. Yeah.

Q. And when they got mastitis, they were removed from the experiment.

A. They were removed from the pen, removed from the treatment.

Q. So their data, during the time they were being treated, was not counted because they weren't getting voltage?

MS. MERCER-LAWSON: Form.

A. I don't know how they were treated. They were still being milked but at a different time.

Q. But they weren't being treated?

A. They didn't get the treatment at that time.
Q. And were there some that -- strike that.
After they were treated successfully, were they put back in the pen or were they replaced by another experimental cow?
A. I think they were put back in the pen.
Q. You don't know for sure?
A. But I don't know for sure.
Q. So if they were removed and treated and their data not counted and then they went back in the pen, that would mean you didn't have data for a full lactation for that cow?
MS. MERCER-LAWSON: Form.
A. For a few days for that cow, that's what we did.
Q. It depends on how long it's treated?
A. Yeah.
Q. Do you know how long it takes to treat a cow that has clinical mastitis?
MS. MERCER-LAWSON: Object to the form, calls for an opinion outside the scope. Go ahead.
A. Not my forte.
Q. So the answer is no?
A. No. We just rest up for four days but, no,

I don't know how.

Q. Then if you can go to page 5, under the Results, it says: Currents delivered at the waterer were variable, was due to changes in environmental conditions and differences between cows and within cows over time.

MS. MERCER-LAWSON: I don't think you got the reading of that exactly right, just so you know.

MR. BIRD: What did I miss?

MS. MERCER-LAWSON: It just wasn't a literal reading of the paragraph.

MR. BIRD: Let me read it again.

BY MR. BIRD:

Q. Currents delivered at each waterer were variable. This variability was due to changes in environmental conditions at the metal mat and differences between cows and within cows over time. Is that a true statement?

A. Yes.

Q. So then were you comparing data for the complete lactation or whatever data you had for each cow in the test?

MS. MERCER-LAWSON: Form, vague.

A. Repeat the question.

Q. The data that you kept, was it -- was it reported out at 305 or was it reported out until the end of that cow's lactation, whether that be before or after 305 days?

A. I think we had the data from the milkings for whichever one of those periods we wanted to examine.

Q. What was reported in terms of the study and your conclusions?

A. Well, it says: A comparison of the 305 actual values in the previous lactation for the four groups. So we compared 305 values it looks like.

Q. Okay. And what if you didn't have all the data?

MS. MERCER-LAWSON: Form, incomplete hypothetical. Go ahead.

A. I'm not sure how they handled that.

Q. I guess what I'm asking, if you're putting in a cow 7 to 10 days after it gives birth to the calf, it means you're missing the first 7 to 10 days of milk.

A. That's right.

Q. By definition, that's going to mean it's not a complete or full lactation, correct?

A. Okay.

Q. Because you're missing the first 7 to 10 days.

A. I don't know how lactations are counted but -- so I don't know whether that's true or not but they're certainly missing -- you're not getting data for the first 10 days.

Q. You're comparing that to the previous 305, which is a calculated number and not necessarily reflecting the milk over the entire lactation of the cow, correct?

A. The whole process of how all of that stuff is calculated is not something that I'm overly familiar with. It was not something I dealt with.

Q. Go to page 6, the bottom there. It says: In this study --

A. Bottom where?

Q. Bottom of page 6.

A. Page 6.

Q. In this study?

A. In this study where? Okay. The last sentence, the bottom paragraph.

Q. Did I not say that bottom paragraph?

A. No.

Q. I think I said it.

A. You said on this page.

Q. Are you there?

A. Yes, I got it.

Q. One first-calf heifer, out of a total of 51 animals placed in the 4 volt pen, had to be removed. Okay?

A. Mm-hmm.

Q. It was a herd animal?

A. Mm-hmm.

Q. "This is the only animal that had a problem." So there were 51 animals placed in the 4 volt pen and how do we know which -- are you saying 10 of those animals were experimental animals?

A. That's correct, so one of the replacement animals, is not replacement.

Q. One of the first-calf heifers?

A. One of the -- yeah.

Q. All right. Were the animals, did they have cow numbers, those that were --

A. Cow numbers, ID systems.

Q. All right.

MS. MERCER-LAWSON: Off the record.

(Discussion off the record.)

(Exhibit 633, "Stray Voltage Research Fraud" by Michael Behr, Ph.D., 4/2/97, marked for identification, this date.)

BY MR. BIRD:

Q. I show you what's called Stray Voltage

Research Fraud by Michael Behr. You've heard of him?

A. Yes.

Q. You knew him when he published this document?

A. I heard about it.

Q. You know Dr. Gorewit sued him or a lawsuit about it?

A. I heard about Michael Behr from Dr. Gorewit. I didn't know he sued him.

Q. Is that something you ever looked at in the past?

A. I don't think so.

Q. There are some allegations made in here and I just want to see if you agree or disagree. So if you can go to page 33?

A. Okay.

Q. It gives a listing of animals that were subjected to different voltages and the number of days that they were subjected to those voltages; okay?

A. Okay.

Q. Now, is it your testimony that this wouldn't be an accurate chart?

A. I don't know that I can testify either way.

Q. According to this, the maximum number of days of animals exposed to voltage would have been 356 days and --

A. Let me look at this. I've never seen this.

MS. MERCER-LAWSON: Let's have him read it before he answers questions.

MR. BIRD: I'm not going to have him read the whole thing.

MS. MERCER-LAWSON: If you want him to answer questions about Table 6, look at Table 6.

A. What was your question? Is there a question?

BY MR. BIRD:

Q. Under the data that's shown here, the maximum number of days that any individual cow, and it was cow 3846, received treatment, in this case it was 1 volt, was 356 days.

MS. MERCER-LAWSON: Tell him where you're looking, please.

Q. The right-hand column, the bottom of page 33.

A. I'm getting three digit numbers on this instead of four.

Q. Right there, 356?

A. For cow?

Q. 3846.

A. Okay.

Q. And then you can go -- I want you to count

the number of cows from 356 up to where it says 305.

MS. MERCER-LAWSON: What do you mean by count the number of cows?

Q. Okay. There's -- how many cows does it take to get to the one that was 305 days?

A. Ten cows.

Q. Do you agree with me that you had, in this research you had ten cows that were 305 days in milk or more that were part of the study?

A. I don't know where this data came from.

Q. Have you ever seen the data?

A. I've not seen this data before.

Q. Have you ever seen the data?

MS. MERCER-LAWSON: Object to the form.

A. Ever seen what data?

Q. The data on the number of days that those cows were exposed to the level of voltages?

MS. MERCER-LAWSON: Object to the form, vague.

A. No.

Q. If you could turn to page 35, Dr. Behr is commenting on notebook entries. Did you ever see the notebook entries?

MS. MERCER-LAWSON: Object to the form. Wait until he gets there and he knows what

you're talking about.

A. 35, right.

Q. Bottom of page 35, he's referring to notebook entries that were provided to him and he's commenting upon. Do you recognize there was somebody keeping a notebook entry?

A. I know there was somebody keeping a notebook entry on the cows, on the animals, Animal Science side. Somebody who was looking -- who was observing the cows. I don't know whether I knew they were taking notes or not.

Q. Did you ever see the notebook entries?

A. No.

Q. So you can't tell me if these are true or not?

A. That's correct.

Q. Where would those notebooks be?

MS. MERCER-LAWSON: Form.

A. I don't know.

MR. BIRD: Okay. I'm done. Thank you.

MS. MERCER-LAWSON: Off the record for a couple minutes. Take a short break. I want talk to you in the other room.

(A recess was then taken.)

EXAMINATION BY MS. MERCER-LAWSON:

Q. Dr. Aneshansley, can you get out Exhibit number 620, please? It should be the second one here. Here we go.

A. Okay.

Q. Exhibit 620, this is a one-page document called Daniel J. Aneshansley, Ph.D., Summary of Opinions in Poeschel versus NSP case; true?

A. Yes.

Q. If asked to testify at trial as to all of the opinions that are bullet pointed in Exhibit 620, will you testify consistently with what is in Exhibit 620?

A. Yes.

Q. In other words, are you walking back any of your opinions today as you sit here?

A. I don't -- no.

Q. You're not, correct?

A. Correct.

MR. BIRD: Object to the form.

Q. You'll testify consistently with the opinions in this bullet-point document; is that true?

A. Yes.

Q. If you look at the bottom bullet point, you see where you write: I'm generally familiar with Lawrence Neubauer's methodology for determining

resistance values of individual cows for purposes of stray voltage lawsuits. Do you see where I'm reading, sir?

A. Yes.

Q. You then say you have some concerns about Mr. Neubauer's measurements. Do you see that?

A. Yes.

Q. You weren't asked very many questions about that, if any, at your deposition. Do you intend to express your concerns about Mr. Neubauer's measurements and methodology at trial?

A. Yes.

Q. You would testify consistent with what is in Exhibit 620?

A. Yes.

Q. You were asked some questions about some involvement in prior litigation. Do you remember that generally?

A. Generally.

Q. Why did you become involved in litigation?

A. There were requests for my services. I picked and chose pretty much what I wanted to do. I never advertised for this. As in my role at the university, I thought it was important for me to keep up with all the new variations that were coming out with

respect to stray voltage, and when I saw opportunities to do that, I would participate in litigation.

This one was one in which robotic milking came up. That's the first time I'd seen that or had an opportunity to find out about it and was interested in the ifs, ands, and buts of all that.

Q. Was one of the reasons you decided to be involved in litigation to defend what you believe to be reliable science?

MR. BIRD: Object to the form, leading.

A. That's part of it.

Q. You were asked some questions about an exhibit that purported to be a compilation of papers by a Michael Behr, Ph.D.?

A. Yes.

Q. Who do you understand Michael Behr, Ph.D. to be? And that's B-E-H-R.

A. An economist was my understanding.

Q. Do you understand Michael Behr, Ph.D. to have any expertise in electrical engineering?

A. I don't believe so.

Q. Do you understand Dr. Behr to have any expertise in veterinary medicine or animal health?

A. I don't think so.

Q. Was Dr. Behr involved in the creation of the

USDA Red Book?

A. No.

Q. What is your knowledge of how it is that Dr. Behr alleged that fraud was going on with respect to stray voltage research?

MR. BIRD: Object to the form, foundation.

A. I don't know if I became aware of fraud. I became aware of the fact that requests had been made for all of our data and that it had been turned over to him. He had requested that from Dr. Gorewit and the only thing I had a memory of is that Dr. Gorewit indicated that there was places -- the data that he had given that he hadn't recorded entirely; he missed some of the places on the backside. He only copied the front -- whatever was copied for him only copied the front sides. I don't know if that's true.

That is what -- that's about the only involvement I had with Behr in terms of that document.

Q. Would you ever, in any stray voltage lawsuit, rely upon anything published by Michael Behr, Ph.D.?

A. That's a pretty broad question. I'm not -- probably not but I'd have to look at what he had to say.

Q. Has anything about the questioning that was posed to you by Mr. Bird concerning Dr. Behr caused you

to lose any faith in the strength and reliability of the Red Book?

A. No.

Q. I don't have any further questions, so unless Mr. Bird has some.

EXAMINATION BY MR. BIRD:

Q. You know, I thought I understood your concerns about Neubauer's method and I thought it had to do with the contact points, the bit in the mouth, and --

A. Yeah, we talked about that.

Q. That's the extent of your concerns?

A. Yeah.

Q. It has to do with how he's setting up the animals?

A. And I think some of the concerns also are there are errors associated with each of those resistances he calculates.

Q. What do you mean errors?

A. The values have plus and minus values. The voltage you measure has an error associated with it, and the current has one major error associated with it, and to determine the error of what the resistance is, you got a value which is 250 Ohms, plus or minus something, and those values can be computed if you know the errors

associated with your voltmeter and your amp meter.

It's a process called linear error analysis that can be used to do it. I've never seen any indication in the numbers that I've seen reported by him of what that -- what those errors are, what the spread in values are. I think that's an important part of it.

Q. Anything other than that?

A. Not that I can think of right now.

Q. I'm done, thanks.

MS. MERCER-LAWSON: I'll just put on the record what's going to happen next, Dr. Aneshansley, is Pam will type all of this up into a transcript and she will send you a copy. You'll be able to read the copy, review it for any typographical errors, and then if there are any typos, you're entitled to make those changes before you sign.

THE WITNESS: Okay.

MS. MERCER-LAWSON: Do you understand?

THE WITNESS: Understood.

MS. MERCER-LAWSON: Thank you.

* * *

SIGNATURE PAGE OF DANIEL J. ANESHANSLEY, Ph.D.

PAGE #	LINE #	SHOULD BE CHANGED TO READ	REASON FOR CHANGE

I, Daniel J. Aneshansley, Ph.D., hereby certify that I have read the transcript of my testimony taken under oath and that the transcript is a true and complete record of my testimony and that the answers on the record as given by me are true and correct.

_____
Daniel J. Aneshansley, Ph.D.

Sworn to before me this
___day of _____20__

_____
Notary Public

REPORTER'S CERTIFICATE

I, PAMELA PALOMEQUE, Registered Professional Reporter, certify:

That the foregoing proceedings were taken before me at the time and place therein set forth, at which time the witness was put under oath by me;

That the testimony of the witness and all objections made at the time of the Examination were recorded stenographically by me and were thereafter transcribed;

That the foregoing is a true and correct transcript of my shorthand notes so taken;

I further certify that I am not a relative or employee of any attorney or of any of the parties, nor financially interested in the action.

_____

PAMELA PALOMEQUE, RPR, CRR

Notary Public