Exhibit 4

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA

IN RE: ROUNDUP PRODUCTS LIABILITY LITIGATION,	)	
	)	MDL No. 2741
This document relates to:	)	Case No. 16-md-02741-VC
ALL ACTIONS	)	

VIDEO DEPOSITION OF
BEATE RITZ, MD, PHD
Los Angeles, California
Friday, January 19, 2018

Reported by:
LISA MOSKOWITZ, CSR 10816, RPR, CRR, CLR,
NCRA Realtime Systems Administrator
JOB NO. 136022

January 19, 2018
1:06 p.m.

Video deposition of BEATE RITZ, MD, PHD, held at the offices of Baum, Hedlund, Aristei & Goldman, PC, 12100 Wilshire Boulevard, Suite 950, Los Angeles, California, before Lisa Moskowitz, California CSR 10816, RPR, CRR, CLR, NCRA Realtime Systems Administrator.

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ALSO PRESENT:
SCOTT McNAIR, Videographer

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LOS ANGELES, FRIDAY, JANUARY 19, 2018
1:06 P.M.

THE VIDEOGRAPHER: Good afternoon. This is the start of tape labeled number 1 of the videotaped deposition of Dr. Beate Ritz in the matter of Roundup Products Liability Litigation. This case is before the United States District Court for the Northern District of California, case number bearing MDL number 2741 and case number 16-MD-02741-VC.

This deposition is being held at 12100 Wilshire Boulevard, Los Angeles, California. Today's date is January 19, 2018. The time is approximately 1:06 p.m.

My name is Scott McNair from TSG Reporting, Incorporated. I'm the legal video specialist. The court reporter today is Lisa Moskowitz also in association with TSG Reporting.

Will counsel please identify yourselves for the record.

MR. LASKER: Erick Lasker from

Hollingsworth, LLP, on behalf of Monsanto.

MS. SHIMADA: Elyse Shimada from Hollingsworth, LLP, on behalf of Monsanto.

MR. ESFANDIARY: Pedram Esfandiary of Baum Hedlund, plaintiffs.

MS. FORGIE: Kathryn Forgie on behalf of the plaintiffs.

MR. BAUM: Michael Baum on behalf of plaintiffs.

THE VIDEOGRAPHER: And on the phone?

MR. WOOL: David Wool from Andrus Wagstaff on behalf of plaintiffs.

THE VIDEOGRAPHER: Thank you.

MS. FORGIE: Anyone else on the phone?

THE VIDEOGRAPHER: Will the court reporter please swear in the witness.

Beate Ritz, MD, PhD,
called as a witness, having been duly sworn, was examined and testified as follows:

MS. FORGIE: I have a statement for the record. This deposition is being taken pursuant to pretrial order number 34, and it is limited to the December, 2017 -- not December, 2017. The 2017 AHS study and limited for two-and-a-half hours.

MR. LASKER: Just for clarification, the study will be published in 2018. So I may refer to it as the 2018 study. Beyond that, why don't we get started.

EXAMINATION

BY MR. LASKER:

Q. Dr. Ritz, let me hand to you what's been marked as Deposition Exhibit 30-1.

(Exhibit Number 30-1 was marked for identification.)

BY MR. LASKER:

Q. Dr. Ritz, if you could just identify for the record this is the supplemental expert report that you have submitted in this litigation; correct?

A. Yes.

Q. I'd like to start off if you could turn to page 8 of your report. Toward the top you state "Thus overall and in summary, there is non-differential exposure misclassification from several sources that impact the AHS finding," and then you set forth four different sources; correct?

A. Yes.

Q. Okay. I'd like to walk through those with you today. I'm going to start at the bottom with your comment with respect to the imputation methodology that was used in the study. Okay?

A. Uh-huh.

Q. And you would agree that the investigators for the AHS cohort had used the same imputation method that is used in the 2018 JNCI study and numerous other peer-reviewed and published epidemiological studies of the AHS cohort; correct?

MS. FORGIE: Object to the form.

THE WITNESS: The AHS investigators have used this imputation to impute 50-some pesticides, and they have published mostly on those pesticides.

Those pesticides that are not glyphosate have a very different misclassification structure from glyphosate.
BY MR. LASKER:
Q. I understand that. I just want to --
A. So the imputations work differently when you have a baseline misclassification that you're starting with.
Q. I understand that's your opinion. Just to be clear, there have been numerous publications, epidemiological publications out of the AHS cohort that have used this same imputation methodology; correct?
MS. FORGIE: Objection. Asked and answered. That's the same question you just asked.
You can answer it again.
THE WITNESS: It doesn't matter how many publications there are. Unless they are related to glyphosate they have a very different exposure misclassification structure.
BY MR. LASKER:
Q. Okay. Let me just walk through

some of the studies that I've identified, and let's see if we can reach agreement on the existence of these studies. The first will be marked as 30-2.
(Exhibit Number 30-2 was marked for identification.)
BY MR. LASKER:
Q. I know you're familiar with this study.
MS. FORGIE: How are we numbering these?
MR. LASKER: 30. That's where we are in the sequential.
MS. FORGIE: I see.
BY MR. LASKER:
Q. The document I've handed you, 30-2, is a 2014 published study, "Non-Hodgkin's lymphoma risk and insecticide, fungicide, fumigant use in the agricultural health study," which was authored by a number of the same authors of the 2018 NCI journal study; correct?
MS. FORGIE: Objection. Misstates. Misstates the study. Also object to form. It's compound.

THE WITNESS: I don't know exactly whether every single author is the same one.
BY MR. LASKER:
Q. I didn't mean to say they were. There's a number of the same authors.
A. A number of the same.
Q. This study which was published following peer review uses the AHS imputation methodology in looking at the association between non-Hodgkin's lymphoma and 26 different types of fungicides, insecticides and fumigants; correct?
MS. FORGIE: Object to the form.
THE WITNESS: They're using the same imputations, yes.
BY MR. LASKER:
Q. Let me -- let me mark as the next document in line. This is 30-3, Dr. Ritz.
(Exhibit Number 30-3 was marked for identification.)
BY MR. LASKER:
Q. This is a 2013 publication in the "American Journal of Epidemiology." The lead author is Dr. Koutros. First of all,

you would agree the "American Journal of Epidemiology" is a reputable journal; correct?
A. Well, it's a journal of epidemiology that we use and we publish in, yes.
Q. And, in fact, you've peer-reviewed for this journal; correct?
A. Yes.
Q. It's a reputable journal; correct.
A. It has a reputation, yes.
Q. And in this 2013 publication and the title is "Risk of Total Aggressive Prostate Cancer and Pesticide Use in the Agricultural Health Study," the investigators use the same AHS imputation method to look for associations between prostate cancer and 48 different pesticides; correct?
MS. FORGIE: Object to the form.
THE WITNESS: I don't know. I haven't counted them.
BY MR. LASKER:
Q. Well, it states in the -- it states on the -- at page 64 -- first of all, on

page 64 it notes that the investigators used the same imputation -- AHS imputation methodology that's used in the 2018 JNCI study; correct?

MS. FORGIE: Object to the form.

THE WITNESS: I don't see that. Where is that?

BY MR. LASKER:

Q. For participants, if you're looking at page 64.

A. Yes.

Q. In the left-hand column --

A. Oh, the Heltshe, yes.

Q. Yes.

A. Mm-hmm.

Q. So they use the same imputation methodology in this study; correct?

MS. FORGIE: Object to the form.

THE WITNESS: Well, they use it for different pesticides.

BY MR. LASKER:

Q. Right. With respect to the number of pesticides on page 59 in the abstract, they note that they use this imputation methodology to evaluate 48 pesticides, and

that's in the abstract, the fourth line and fifth line down; correct?

MS. FORGIE: Object to the form.

BY MR. LASKER:

Q. In the abstract.

A. In the abstract it says "using Poisson regression to evaluate lifetime use of 48 pesticides and prostate cancer," yes.

Q. Right. Thank you.

Let's move on. This is a 2015 study. We've marked it as Exhibit 30-4.

(Exhibit Number 30-4 was marked for identification.)

THE WITNESS: By the way, there's no glyphosate in there.

BY MR. LASKER:

Q. That's fine. 30-4 is a publication by -- with a lead author of Dr. Silver. This is published in the "International Journal of Cancer"; correct?

A. Yes.

Q. It's a journal that you've peer-reviewed for; correct?

A. No.

Q. Oh, you never peer-reviewed for

this journal? Maybe I misread that on your C.V.

A. No.

MS. FORGIE: Wait. Let's wait for the question.

THE WITNESS: I can't remember ever peer reviewing this journal.

BY MR. LASKER:

Q. It is a reputable cancer journal, though; correct?

A. I have no idea.

Q. Okay. In this article "Cancer Incidence and Metolachlor Use in the Agricultural Health Study, an Update," if you look at page 2631 right above "Statistical analysis," the investigators in this publication with the AHS cohort also used the same imputation methodology used in the 2018 JNCI study; correct?

MS. FORGIE: Object to the form. Also take as much time as you want to read.

THE WITNESS: I have to see what the --

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BY MR. LASKER:

Q. Note 15.

A. Yes.

Q. So they use the same imputation method in this study; correct?

MS. FORGIE: Object to the form.

THE WITNESS: They use this imputation for metolachlor, yes.

BY MR. LASKER:

Q. Let's go to the next document in line.

(Exhibit Number 30-5 was marked for identification.)

BY MR. LASKER:

Q. This will be Exhibit 30-5.

MS. FORGIE: This is 30-5?

MR. LASKER: 30-5.

BY MR. LASKER:

Q. So this is the 2015 publication "Incidence of Solid Tumors Among Pesticide Applicators Exposed to the Organophosphate Insecticide Diazinon in the Agricultural Health Study, an updated analysis." If you look at page 497 --

MS. FORGIE: Again, take your time.

Read as much as you need.
BY MR. LASKER:
Q. Under "enrollment assessment"?
MS. FORGIE: Wait. 497 enrollment assessment.
MR. LASKER: Yes, on the left-hand side about two-thirds of the way down on page 197, you see "enrollment assessment"?
THE WITNESS: No.
MS. FORGIE: No. I see "exposure assessment."
MR. LASKER: Exposure assessment. I'm sorry. I misspoke.
MS. FORGIE: I'm sorry. I wasn't trying to be difficult. I didn't see it.
MR. LASKER: No, that's fine.
BY MR. LASKER:
Q. As you can see if you look to footnote 18 which is also to the Heltshe paper and you can confirm that, but in this 2015 paper lead author Dr. Jones, they also use the same AHS imputation methodology used in the 2018 JNCI study; correct?

MS. FORGIE: Object to the form.
THE WITNESS: Let's see.
BY MR. LASKER:
Q. If you look at the --
MS. FORGIE: Wait, let her read.
THE WITNESS: Oh, multiple imputation. I got it. Yes. I see it.
BY MR. LASKER:
Q. So they use the same imputation methodology as the 2018 JNCI study; correct?
MS. FORGIE: Object to the form.
THE WITNESS: They use it for diazinon.
BY MR. LASKER:
Q. This is an article that was published after peer review in the "Journal of Occupation of Environmental Medicine"; correct?
A. Correct.
Q. Let's move to the next one in line. This is 30-6.
(Exhibit Number 30-6 was marked for identification.)
MR. ESFANDIARY: Counsel, do you have extra copies for me as well?

BY MR. LASKER:
Q. This is an article that was published in the "International Journal of Epidemiology" in 2016, lead author is Dr. Koutros; correct?
A. Yes.
Q. And if you could look to page 794 -- I just can't remember if I said this. This is "Occupational Exposure to Pesticides and Bladder Cancer Risk." If you look on page 794, in the exposure assessment. And, again, they refer in the text as well as in the footnote to the Heltshe paper, this study also used the same imputation -- AHS imputation methodology as the 2018 JNCI study; correct?
MS. FORGIE: Object to the form and, again, take your time to review it.
THE WITNESS: Where was that again.
BY MR. LASKER:
Q. Exposure assessment at the end of the first paragraph.
A. Oh, Heltshe, et al., yes, I see it.
Q. So, again, this study used the same imputation methodology as the 2018 JNCI

study; correct?
MS. FORGIE: Object to the form.
THE WITNESS: Yes, they do.
BY MR. LASKER:
Q. Okay.
A. But they find the same result as usual. They only find positive associations for the pesticides that are more or less not in use anymore, and that confirms my assessment.
Q. Let's move to the next document. This is Exhibit 30-7.
(Exhibit Number 30-7 was marked for identification.)
BY MR. LASKER:
Q. This is an article, lead author of Dr. Engel.
A. Yes.
Q. Entitled "Insecticide Use and Breast Cancer Risk Among Farmers' Wives in the Agricultural Health Study" published in the "Journal of Environmental Health Perspectives"; correct?
A. Yes.
Q. And if you look at page 3 -- 2 and

3, the second and third page of this publication. It sort wraps over -- oh, no, it's on page 3, bottom of the left-hand column going to the top of the right-hand column.

MS. FORGIE: I'm sorry. What page are we on now?

MR. LASKER: The third page, I'm sorry. The bottom of the left-hand column going to the top of the right-hand column.

BY MR. LASKER:

Q. In Engel publication, they also use the same AHS imputation methodology that was used in the 2018 JNCI study; correct?

MS. FORGIE: Object to the form.

THE WITNESS: They say they used the same imputation, but these are different individuals.

BY MR. LASKER:

Q. Understood. But they use the same imputation methodology; correct?

MS. FORGIE: Object to the form. Take your time.

THE WITNESS: They used Heltshe

2012, yes.

BY MR. LASKER:

Q. Let's go to the next document. This is the 2017 -- this is Exhibit 30-8.

(Exhibit Number 30-8 was marked for identification.)

THE WITNESS: Just a second.

MS. FORGIE: Hold on. She's still reviewing the other one.

BY MR. LASKER:

Q. Exhibit 30-8; correct? And this is an article lead author Bonner entitled "Occupational Exposure to Pesticides and the Incidence of Lung Cancer in the Agricultural Health Study, published in the Journal of Environmental Health Prospectus"; correct?

A. Yes.

Q. And if you look to page 545 of this publication in the middle column towards the bottom, you can see, again, the reference to Heltshe, and this publication appeared to be a publication that also used the same imputation methodology as was used in the 2018 JNCI study; correct?

MS. FORGIE: Object to the form.

THE WITNESS: They used Heltshe, yes. Heltshe 2012.

BY MR. LASKER:

Q. And you would agree that independent peer review is a corner of science in the United States and internationally; correct?

A. It is, but it doesn't always work.

Q. And you would agree that the peer review process provides the intellectual rigor required to ensure that manuscripts adhere to what is acceptable in the field with regard to reviewing the relevant literature and examining statistics and determining whether research protocols apply widely accepted methods, report valid results, and avoid or account for biases and draw conclusions appropriate to the study's findings; correct?

MS. FORGIE: Object to the form.

THE WITNESS: Peer review is supposed to do that, that it always reaches that goal is a high order.

BY MR. LASKER:

Q. And you are not aware in the five

years now since the first of these peer-reviewed epidemiological analyses that we just walked through were published of any letter to the editor or published response to any of these studies that have criticized those studies for their use of imputation for the 37 percent of the AHS cohort that did not respond to phase 2; correct?

MS. FORGIE: Object to the form. Are you including the AHS study?

MR. LASKER: For this purpose --

MS. FORGIE: It wasn't clear in your question.

MR. LASKER: The studies we looked at are not including the 2018 NCI study.

BY MR. LASKER:

Q. For the studies we just marked as Exhibits 30-2 to 30-8 which were first published five years ago, are you aware of any letter to the editor or published response to any of these epidemiological studies that have criticized those studies for their use of imputation method for the 37 percent of the AHS cohort that did not respond to the phase 2 questionnaire?

MS. FORGIE: Object to the form.
THE WITNESS: Since I did not read all of these papers, I cannot tell you whether there's a letter because I haven't looked them up. However, I wouldn't be surprised if there weren't because most of these papers did not include glyphosate.
BY MR. LASKER:
Q. In your role as the chair of the AHS outside advisory group, you've not been made aware of any criticism of any of these published studies, Exhibits 30-2 through 30-8, for their use of the AHS imputation method to derive AHS exposure data; correct?
MS. FORGIE: Object to the form.
THE WITNESS: This advisory group has not met for ten years.
BY MR. LASKER:
Q. You have had --
A. And these papers are five years old.
Q. Are you aware -- well, let me put it to you this way: Have you, as the chair of the AHS advisory group, reached out to

any of the investigators, authors of these publications, to raise questions or concerns about the use of this imputation methodology in all of these peer-reviewed publications?
MS. FORGIE: Object to the form. Asked and answered.
You can answer it again.
THE WITNESS: Well, the most problem I have with the method is in terms of glyphosate, and most of these papers do not refer to glyphosate.
BY MR. LASKER:
Q. Okay. Let me clarify that. Is it your opinion that the imputation methodology used in the AHS for phase 2 non-responders is unreliable in general, or is your criticism specific to the use of the imputation method for glyphosate?
MS. FORGIE: Object to the form.
THE WITNESS: My criticism is that this imputation method does not take into account time varying exposures, especially dramatically timed varying exposures. So any pesticide that falls under the category of huge increase over

the time of the study would have that criticism. Glyphosate, in my mind, is the one -- is currently the one that's most affected.
BY MR. LASKER:
Q. Is it your opinion that the studies that have used imputation methodology for pesticides other than glyphosate are unreliable?
MS. FORGIE: Object to the form.
THE WITNESS: Again, these imputations work based on assumptions we are making, and these assumptions may be much more valid or I think they are quite valid for any of the pesticides where the use didn't change. For example, for lindane and DDT that has been mostly used in the '70s or maybe in the '80s. DDT was outlawed in '72. So for those, I have absolutely no problems because what was reported at baseline is the use that happened, and it shouldn't have changed after baseline. So whatever was imputed from baseline to the future was probably correct. This

is not the case when you look at a very changing exposure environment especially one like glyphosate where use just exploded.
BY MR. LASKER:
Q. For pesticides that continue to be used but where the prevalence of use did not increase dramatically, do you have a -- do you believe that the use of the imputation methodology for those pesticides is unreliable?
MS. FORGIE: Objection. Asked and answered.
You can answer it again.
THE WITNESS: Yes. As much as you can establish in a baseline whether the answers are error free or not and then use that baseline to predict the future and the future hasn't changed much in use, you have a reliable method. And I think for most of these pesticides they had a reliable method because probably half of them weren't even used anymore after baseline, so they already had everything they needed. All they had to

do is add no exposure. So it's very easy to have a reliable imputation method when you basically have no additional exposure coming, right? This is very different if an exposure kind of trickles along and then all of a sudden rises.

BY MR. LASKER:

Q. I understand that. I just want to be clear. Pesticides other than glyphosate where the use was fairly stable through phase 1 and phase 2, do you believe that the use of the imputation methodology was reliable?

MS. FORGIE: Objection. Asked and answered.

You can answer it again.

THE WITNESS: Imputation works best when there's no time varying factor unless you can actually account for the time varying factor.

BY MR. LASKER:

Q. Okay. Now, a number of these published studies that we just looked at do use the imputation methodology with respect

to glyphosate; correct?

MS. FORGIE: Objection. Object to the form.

THE WITNESS: They're using the same imputation method for all of the pesticides, yes.

BY MR. LASKER:

Q. And in a number of these publications actually use that imputation methodology to report findings, or in this case, lack of associations for glyphosate; correct?

MS. FORGIE: Objection. Object to the form.

THE WITNESS: I would have to review all of the results.

BY MR. LASKER:

Q. Let's take a look and go back to them. If you could look at the paper by -- there's two papers by Koutros.

MS. FORGIE: Two papers by who?

MR. LASKER: Koutros. 2013 and 2016.

MS. FORGIE: So 30-6 and 30-3.

MR. LASKER: Yes.

BY MR. LASKER:

Q. So 30-3, let's look at 30-3. That would be 2013.

MS. FORGIE: Hold on a second. Let's make sure we've got the right ones. Yeah, okay.

BY MR. LASKER:

Q. That is the article "Risk of Total and Aggressive Prostate Cancer and Pesticide Use in the Agricultural Health Study." If you can look to the supplemental tables that are provided with the study --

MS. FORGIE: Do you have a page number?

MR. LASKER: They're at the end.

MS. FORGIE: Oh, supplemental. I didn't hear that.

BY MR. LASKER:

Q. If you go to the web Table 2 at the end in the second page, that's web Table 1. You can look at that as well.

MS. FORGIE: But take your time and look at whatever you need to look at.

BY MR. LASKER:

Q. And --

MS. FORGIE: Wait. She's still reviewing.

MR. LASKER: That's fine.

THE WITNESS: Yeah, what table?

BY MR. LASKER:

Q. It's Table 2, web Table 2. It has a list of the different pesticides that are being studied for prostate cancer.

A. Uh-huh.

Q. And the second page you can see that they use imputation method to analyze whether there's association between prostate cancer and glyphosate in this paper; correct?

A. The second -- are you referring to the glyphosate?

Q. Yes.

A. Yeah, okay. Yeah.

MS. FORGIE: What's the question?

BY MR. LASKER:

Q. My question is in the 2013 Koutros paper, they used the imputation method to look at the association between glyphosate and prostate cancer; correct?

A. Yes, that's what they do.

Q. If you can go to 30-6, which is the Koutros 2016 paper, "Occupational Exposure to Pesticides and Bladder Cancer Risks," and if you look on page 796, Table 2, they have a listing of the different pesticides that they were looking at with respect to bladder cancer; correct?

A. Yep.

Q. And in the Koutros 2016 publication, they use the imputation method, the AHS imputation method to look for an association between glyphosate exposure and bladder cancer risk; correct?

MS. FORGIE: Take your time.

THE WITNESS: For every use, yes.

BY MR. LASKER:

Q. And they also have on Table 3, and this is stratified by smoking status for reasons specific to the publication --

MS. FORGIE: It was what? I didn't hear that word.

MR. LASKER: Stratified by smoking status.

MS. FORGIE: Thank you.

///

BY MR. LASKER:

Q. If you look at Table 3, the second page on page 799 of that table, you can see they also use the imputation method to look at associations for glyphosate in the dose response analysis; correct?

A. Yes. And they find a significant trend for never smokers.

Q. Okay. And do you find that association to be reliable --

A. No, absolutely not.

MS. FORGIE: Wait, wait. We have to wait for the question. I'm sorry.

What was the question?

BY MR. LASKER:

Q. She made a comment and I asked whether she was relying upon a finding for glyphosate in that study, and that was her answer.

MS. FORGIE: Objection. I didn't hear a question and answer.

BY MR. LASKER:

Q. And then Bonner 2017, I think that is 30-8. If you look at -- this is looking at pesticide exposure and the incidence of

lung cancer.

MS. FORGIE: Hold on a second. Sorry.

BY MR. LASKER:

Q. And again there is supplemental materials in that -- for that publication with additional analyses. If you look at table S-3 and the second page of table S-3 in the Bonner 2017 publication, they use the same AHS imputation methodology to look for associations between glyphosate use and lung cancer at various exposure quartiles; correct?

MS. FORGIE: Object to the form.

THE WITNESS: Yes, they are showing this, comparing non-exposed to exposed.

BY MR. LASKER:

Q. And, of course, the 2018 JNCI study of glyphosate-based herbicides and cancers including non-Hodgkin's lymphoma, that used the same imputation methodology in looking at the association between glyphosate and various types of cancers; correct?

MS. FORGIE: Object to the form.

THE WITNESS: They always use the

same imputation method. That doesn't make it right.

BY MR. LASKER:

Q. But we have four different peer-reviewed publications now where the AHS imputation methodology has been used in looking at associations between glyphosate and various kinds of cancer; correct?

MS. FORGIE: Object to the form.

THE WITNESS: Most of these glyphosate results were in supplements. The papers refer to their positive findings. They give the negative findings which is very appropriate in a supplement, and generally, you do not generate in science a big brouhaha over nothing. You always generate a brouhaha when there is actually a positive finding and somebody thinks you shouldn't have a positive finding. For all the studies that were done bad enough so we have no findings, nobody complains, and that's a problem.

BY MR. LASKER:

Q. Let me just ask this question, I

just want to make sure I'm clear on this. There are four peer-reviewed publications that have used the AHS imputation methodology in looking at associations between glyphosate and various types of cancer; correct?

MS. FORGIE: Object to the form.

THE WITNESS: These studies did not target glyphosate. They are providing estimates for glyphosate in supplements or in additional analyses. They all were after a different kind of pesticide, and that's for a good reason because they either showed prior results for these kind of agents and they wanted to see whether the follow-up showed the same positive associations and just in the -- in the publication they provide the results for everything else, but they're focusing on different pesticides and they have a hypothesis for these other pesticides where the agents are related to the cancer. They did not have the hypothesis that glyphosate was causing prostate cancer, that glyphosate

was causing lung cancer, that glyphosate was causing bladder cancer. Therefore, it was not the focus so nobody would make that a focus of their review. The focus of the review would be on the hypothesis, and they tested the hypothesis for different pesticides.

BY MR. LASKER:

Q. Just to be clear and the documents will speak for themselves, putting aside the 2018 JNCI study, the three other studies that looked at a glyphosate using the same imputation methodology were all studies like the 2014 publication on fungicides that looked at a broad range of different pesticides to determine whether there was associations with any of the pesticides that they examined; correct?

MS. FORGIE: Object to the form.

THE WITNESS: No, these studies usually have one or two pesticides in mind because there is prior literature that connects certain pesticide to a certain cancer because not every cancer is the same; right? Cancer is 50, 100

different diseases as we all know. So we should not say any pesticide in any cancer. That's what these colleagues actually do really well. They pick out the agents and the cancers that they have a prior hypothesis for. However, they are also giving you in addition everything else they have, but that is never a focus of these papers. That is just for transparency and for documentation in the literature, but nobody ever focuses on that.

BY MR. LASKER:

Q. Just so I understand for these three papers it is your understanding, and these are the two papers by the lead author Dr. Koutros in 2013 and 2016 and the publication by Dr. Bonner in 2017 that in those publications they are focused on specific pesticides at the outset of their analysis but then they just reported on other pesticides as additional information?

MS. FORGIE: Object to the form.

THE WITNESS: I did not read these papers; so I don't know exactly what

they're stating. But from what I know about the papers I read in the AHS, that's what they are usually doing when they are writing these papers. Yes, they have specific hypotheses, and they don't say I'm testing 52 associations.

BY MR. LASKER:

Q. Now, as you've already said, your concern about glyphosate and the use of the imputation methodology was the increase in glyphosate use -- the significant increase in glyphosate use between phase 1 and phase 2 of the questionnaire; correct?

MS. FORGIE: Object to the form.

THE WITNESS: Actually, it's at the end of the intake questionnaire at enrollment.

BY MR. LASKER:

Q. Through the phase 2 period?

A. Yes.

Q. What is your understanding of the reason for the increase in glyphosate use during this time period?

A. The GMO crop use.

Q. We're talking about Roundup Ready

crops; right?
A. Yes.
Q. Which Roundup Ready crops were introduced during this period?
A. Well, soy and what else? There was cotton. There was corn, and there was one other that I always blank on. What was it?
Q. I actually think there's only three but if you --
MS. FORGIE: Wait, wait.
THE WITNESS: There's one more but I always blank on it.
BY MR. LASKER:
Q. Did the introduction of Roundup Ready crops result in any changes in how farmers applied glyphosate?
MS. FORGIE: Object to the form beyond the scope of the report.
THE WITNESS: It definitely increased the amounts and also probably changed the way they were applied because you now don't have to take care -- very much care of not spraying the good plants, right? You can actually spray them in a very -- in a

massive way.
BY MR. LASKER:
Q. And it would be fair to say that, would it not, that the increase in glyphosate use from the end of the phase 1 questionnaire period through phase 2 was almost entirely due to the increased use on those three crops soybean, corn, and cotton; correct?
MS. FORGIE: Object to the form.
THE WITNESS: An overwhelming percentage is probably due to this, but that doesn't mean it wasn't used for other purposes as well because as we know when farmers have one pesticide in their hand, they use it for everything. It's like a hammer for a carpenter. They use it on everything.
BY MR. LASKER:
Q. And let's mark as the next document in line the Benbrook paper which you cited in your expert report. This will be Exhibit 30-9.
(Exhibit Number 30-9 was marked for identification.)

BY MR. LASKER:
Q. This is, for the record, an article or study by Charles M. Benbrook "Trend in Glyphosate Use in the United States and Globally." This is an article you cited in your supplemental expert report; correct?
A. Uh-huh, yes.
Q. At page 3 of this Benbrook article, there is a time trend that looks at the percentage of acres treated with glyphosate by year for soybean; correct?
A. Yes, for soybean.
Q. And soybean -- soybeans are -- soybeans is, soybeans are -- soybeans is one of the leading crops grown by the pesticide applicators in the AHS cohort; correct?
MS. FORGIE: Objection. Object to the form.
THE WITNESS: In Iowa and North Carolina?
BY MR. LASKER:
Q. Well, for example, in Iowa roughly 80 percent of the cohort members grew soybeans; correct?
MS. FORGIE: Object to the form.

THE WITNESS: That may be, but they have varied crop use; so it's not just soybeans.
BY MR. LASKER:
Q. And by 2005 as reported in Benbrook, we know that virtually all of the AHS cohort members who grew soybeans would have had exposure to glyphosate; correct?
MS. FORGIE: What was the date you gave?
MR. LASKER: By 2005.
MS. FORGIE: Would you read that question back, please.
(Record read by the reporter as follows:
"QUESTION: And by 2005 as reported in Benbrook, we know that virtually all of the AHS cohort members who grew soybeans would have had exposure to glyphosate; correct?"
MS. FORGIE: Object to the form.
THE WITNESS: Actually, we don't know that because he's not referring to the AHS.

BY MR. LASKER:
Q. Yes, but in his table on Figure 2, he reports that 90 percent of all soybeans farmed in the United States --
MR. BAUM: Figure 2?
MR. LASKER: I'm sorry. Figure 1. Figure 1A.
BY MR. LASKER:
Q. 90 percent of all soybeans farmed in the United States by 2005 was being -- were being treated with glyphosate; correct?
MS. FORGIE: Object to the form.
THE WITNESS: It's per acres. I don't know whether the acres refer to all soybeans other than in Iowa. This is the U.S.
BY MR. LASKER:
Q. Right. In the United States, 90 percent of all acres of soybeans were being treated with glyphosate; correct?
MS. FORGIE: Object to the form.
BY MR. LASKER:
Q. By June, 2005.
A. Probably 80 or 90.
Q. And for a farmer who was growing

soybeans during this phase 2 period, given this high prevalence of glyphosate use on soybeans, we can have fairly high confidence that they would have been using glyphosate; correct?
MS. FORGIE: Object to the form.
THE WITNESS: That would depend on whether the farmer applied himself or hired a company to apply or hired farm workers to apply.
BY MR. LASKER:
Q. Sure. But for the AHS cohort we're dealing with pesticide applicators by definition; correct?
MS. FORGIE: Object to the form.
THE WITNESS: We are dealing with pesticide applicators at enrollment. We are not dealing with pesticide applicators necessarily at follow-up. They might be retired. They might have changed their farming practices. They may have hired people to farm for them. All of these are very relevant questions.
///

BY MR. LASKER:
Q. Okay. But to the extent that the individuals in the cohort continued to be farmers, and they were farming their own land, if they were farming soybeans in 2005, we can say given these statistics in Benbrook of the almost 90 percent usage of glyphosate on soybeans, that those Farmers would have been applying glyphosate; correct?
MS. FORGIE: Object to the form. Calls for speculation.
THE WITNESS: We might be able to say that for 2005, but we might not be able to say that for 200 -- '92 through 2005 because there's a rise, and we absolutely don't know when the farmers started using.
BY MR. LASKER:
Q. We would know that a soybean farmer who was still farming in 2005 would likely have exposure to glyphosate regardless of whether they filled out a phase 2 questionnaire; correct?
MS. FORGIE: Object to the form.

THE WITNESS: I would not say so. Again, he might have given the equipment to his son to now spray or rented it out because we know that farming practices with GMOs changed quite a bit, and, you know, you might hire a little airplane to fly over and spray instead of going around with your backpack sprayer.
MS. FORGIE: Were you finished?
THE WITNESS: Uh-huh.
BY MR. LASKER:
Q. To the extent that the AHS cohort member continued to be farming his own land and he was a soybean farmer, we would have fairly strong confidence that that soybean farmer was exposed to glyphosate in 2005 whether or not they filled out a phase 2 questionnaire or not; correct?
MS. FORGIE: Object to the form. Asked and answered.
You can answer it again.
THE WITNESS: You can make a strong guess, but you wouldn't know.
BY MR. LASKER:
Q. And the -- given that fact that one

variable whether or not a cohort member farmed soybeans would allow for a fairly simple imputation into phase 2 for whether or not that farmer was exposed to glyphosate, wouldn't it?

MS. FORGIE: Object to the form.

THE WITNESS: In fact, it wouldn't unless you are actually having data for the whole period prior -- between the first and the second phase, and they didn't have that data. They only had data for the last year. So you have no idea when the farmer changed, and you may misclassify this exposure in either way. You may call them exposed and he wasn't until 2005 and he switched over in 2005. You wouldn't know. Or you could call him unexposed and he actually switched in 1996 and you're missing ten years of exposure.

BY MR. LASKER:

Q. I'm talking about I know there's other issues you have about the initial questionnaire and exposure classification, but for purposes of imputation in

determining whether or not a farmer who was farming in 2005 but did not fill out that questionnaire, if they're a soybean farmer, the imputation of ever exposure for glyphosate is pretty simple, isn't it?

MR. BAUM: Object to the form. Asked and answered.

You can answer it -- wait, let me finish.

You can answer it again.

THE WITNESS: So the worst way of imputing is ever never. They fairly ever show ever never tables. You saw that they showed quartiles and they used intensity scores. And these intensity scores are made out of duration variables and variables of how much they use protective equipment, et cetera. And that they imputed. They imputed duration. They have no idea if you interviewed somebody in 1993 who does not report glyphosate use, is a soybean farmer and in 2005 is not interviewed. They impute assuming they know when this farmer switched over, and they can make

a lot of different assumption. They can make the assumption that that farmer must have switched in 1995 straight away, was exposed for 10 years until 2005, or he switched over in 2004 or '05 and was exposed for one year. That makes a big difference in intensity rating.

BY MR. LASKER:

Q. Let's break this out. I appreciate that. For purposes of -- let's talk about ever never first, and then we'll get to duration, intensity, days of use. For purposes of ever never only, the imputation method for a soybean farmer, for soybeans as the variable, would allow you to determine that the soybean farmer who didn't fill out the phase 2 questionnaire would have exposure to glyphosate, but if I understand you correctly, your concern is you wouldn't know how much exposure?

MS. FERGIE: Object to the form.

A. You wouldn't know how much; you wouldn't know how long, or and you wouldn't know whether he was really the one when they

switched over to GMOs was the main applicator because he didn't report it to you.

Q. Now, with respect to the issue of how often a farmer or a cohort member would apply glyphosate, we already discussed this and Benbrook discusses it as well. With the introduction of Roundup Ready technology, there was a -- sort of a consistent change in how glyphosate could be used on those crops; correct?

MS. FORGIE: Object to the form.

THE WITNESS: There were prescriptions of how they should be used, yes.

BY MR. LASKER:

Q. And, for example, in the Benbrook paper on page 10 in the left-hand column with respect to -- at the bottom it talks about the impact of GEHT technology. It's talking about Roundup Ready crops; correct? The bottom of --

A. Yes, yes.

Q. So the development and marketing of GE Roundup Ready crops fundamentally changed

how crop farmers could apply glyphosate; correct?
A. Yes, that's what it says.
Q. Before Roundup Ready technology, farmers could spray glyphosate prior to crop emergence for early season weed control or after harvest to clean up late season weeds; correct?
A. Yes, that's what's it says.
Q. With Roundup Ready crops, glyphosate can also be sprayed one to three times or more after the crop emerged leaving the crop unharmed but controlling all actively growing weeds; correct?
A. Correct.
Q. So for a soybean farmer who is continuing to farm during that phase 2 period, we not only would know that that farmer likely is using glyphosate, but we also would have a pretty consistent understanding of the change of use in glyphosate; correct?
MS. FORGIE: Object to the form.
THE WITNESS: Only if they had asked about it, and they didn't.

BY MR. LASKER:
Q. Okay. Well, regardless -- when you say "they asked about it," you're talking about the --
A. In the follow-up question --
MS. FORGIE: Wait, wait, there's got to be questions and answers.
BY MR. LASKER:
Q. With respect to the -- I understand whatever is in the questionnaire, I'm talking about what actually would be happening with these farmers. One of the questions was how many days per year per use in that reference year for phase 2; correct?
MS. FORGIE: Object to the form.
THE WITNESS: It asked the same questions as at baseline but only referred to about a 12-month period, yes.
BY MR. LASKER:
Q. And for farmers who farm Roundup Ready crops and, of course, we have 63 percent of the cohort who responded to the phase 2 questionnaire, we would -- if those 63 percent, we would see that those

farmers are now using glyphosate on Roundup Ready crops, and as you stated, there is a pretty standard change in how glyphosate would be applied; correct?
MS. FORGIE: Object to the form.
THE WITNESS: We would know it for a 12-month period, and now we have to impute everything between baseline and that period not knowing when this started.
BY MR. LASKER:
Q. Okay. So that deals with duration. I understand that. But as far as the days of use then in that reference year, we would have information based upon the fact that soybean farmers farming Roundup Ready crops would be applying glyphosate following these guidelines; correct?
A. Well, we hope that farmers follow guidelines. They don't always do.
Q. Right. Then with respect to the issue of intensity factors, one of the issues there is how the pesticide is applied; correct?
A. That is one way, yes.

Q. And with Roundup Ready crops, again, as you mentioned that allows farmers to apply glyphosate, and the weed management guidelines talk about the fact that you can apply the pesticide in a different way than you did before because of the fact that they're Roundup Ready crops; correct?
MS. FORGIE: Object to the form.
THE WITNESS: They are most likely differences in application. Whether or not they increase or decrease exposure is another question because you also have to get the glyphosate ready by mixing, and you have to also clean the equipment, and all of these are heavy duty exposure scenarios.
BY MR. LASKER:
Q. And that would be a change that would be seen in the 63 percent of the cohort who are soybean farmers who are now farming with Roundup Ready crops who would see how that impacts the different ways that they apply the pesticide; correct?
MS. FORGIE: Object to the form.
THE WITNESS: I don't understand

the question.
BY MR. LASKER:
Q. We have information from the 63 percent who filled out the questionnaire about these intensity factors, what protective equipment gear they used, how much they mixed the pesticide, all of those questions were asked, and for the 63 percent of the cohort we would have that information; correct?
MS. FORGIE: Object to the form.
THE WITNESS: In fact, we might not, and the reason is that this question about protective gear and equipment was asked for all pesticides, not specifically for glyphosate. So we have absolutely no idea what they did with glyphosate.
BY MR. LASKER:
Q. But to the extent that we have information and that this is, I take it, an issue that you would have for all pesticides with respect to the information on foot protective gear and mixing within the AHS; correct?

MS. FORGIE: Object to the form.
THE WITNESS: Yes and no. Because you can imagine that when you ask these questions, the farmer will refer to the most used pesticide.
BY MR. LASKER:
Q. Okay.
A. Or the most toxic.
Q. For the most used pesticide I think we can be -- I think you've said this. The most used pesticide certainly during this phase 2 period was glyphosate; correct?
MS. FORGIE: Objection to the form.
THE WITNESS: It is -- glyphosate is certainly highly used, but it is never the only pesticide any of these farmers used.
BY MR. LASKER:
Q. I understand --
MS. FORGIE: Wait, let her finish.
THE WITNESS: Farmers expect glyphosate that's a weedkiller and not acutely toxic to them or doesn't induce any symptoms, they don't expect that to make them as sick as other pesticides

against which they have been warned throughout their lives like the OPs that are neurotoxic and that make them feel bad. So whatever protective equipment they are reporting, they are most likely reporting for the most toxic pesticide.
BY MR. LASKER:
Q. All right. So previously you had stated -- the record will reflect if it's correct or not, that you thought the farmers would be reporting their application method, their protective gear for the pesticide they used the most or the pesticide that's most toxic, and now it's your opinion that they would be reporting their protective equipment only for the pesticide that they think is most toxic; is that correct?
MS. FORGIE: Objection. Mischaracterizes her testimony.
THE WITNESS: It is whatever they remember using it for, and my guess is that what they remember the best is the most toxic and/or the most used.
BY MR. LASKER:
Q. To the extent that they're

reporting their protective equipment and application methods with respect to the pesticide that's most used for a Roundup Ready farmer, then that information that's provided for the 63 percent that filled out the phase 2 questionnaire would reflect that change that occurred when they started farming with Roundup Ready crops; correct?
MS. FORGIE: Object to the form.
THE WITNESS: Well, again, they only reported for one year.
BY MR. LASKER:
Q. Right. And for that one year the information that's provided with respect to application method, protective gear would reflect their application method for glyphosate; correct?
MS. FORGIE: Objection. Mischaracterizes her testimony, asked and answered.
THE WITNESS: I cannot speculate about this because we all know that these farmers get more and more information about the hazards of pesticides. So they may have at any

point in time changed their application methods and/or protective equipment use and we don't know it because it's only reported for the last year. Especially the ones in the AHS study because they are constantly bombarded with information from the study about the hazards of pesticides. So we have no idea who changed what.

BY MR. LASKER:

Q. But while -- am I correct in my understanding, though, that you believe while this is speculation on your part, that the information would be unreliable for glyphosate but not unreliable for other pesticides?

MS. FORGIE: Objection. Mischaracterizes the testimony, asked and answered.

THE WITNESS: I would have to answer that for every single pesticide because every pesticide has a different scenario, just like every cancer is not the same cancer.

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BY MR. LASKER:

Q. So with respect to this concern that you have for the imputation methodology, this is a concern that is for all pesticides, not just glyphosate; is that correct?

A. That's not what I said.

Q. That's why I'm asking the question.

MS. FORGIE: So wait. Let's get the question.

BY MR. LASKER:

Q. Let me ask the question again. Am I correct in my understanding, maybe I'm not, of your last answer that your concern about the fact that these farmers could be changing their application methods or their -- over time, is that a concern that is unique to glyphosate, or do you think that applies to all the pesticides where there's imputed information in the AHS study?

MS. FORGIE: Object to the form. Also asked and answered.

You can answer it again.

THE WITNESS: It will be a

difficult one to answer, although my guess is since these are trained pesticide applicators, they are trained in which pesticides to recognize as most toxic and acutely toxic and also where they warned you should be wearing protective equipment, where other pesticides may not be considered as toxic and so they are not using the same precautions.

BY MR. LASKER:

Q. Do you know how these pesticide applicators were trained with respect to what protective gear to use in connection with which pesticides?

A. That is what they had to answer during their application exam.

Q. That wasn't my question. My question is do you know how these farmers were trained with respect to what protective gear they should wear with respect to which pesticide?

MS. FORGIE: Objection. Asked and answered.

You can answer it again.

THE WITNESS: I would imagine that they did; otherwise, I would think that these Ag Health specialists didn't do their jobs.

BY MR. LASKER:

Q. I'm not asking the question correctly. I'm sorry. I'm not asking you whether or not these people did receive training. My question is do you, Dr. Ritz, know what the training was that they received, for example, with respect to what protective gear you should wear while applying glyphosate?

MS. FERGIE: Objection. Asked and answered.

You can answer.

A. I was not part of that field work of the AHS study, so I wouldn't know that exactly. But I would imagine that the Ag Health educators are not different in California from Iowa and North Carolina in that they are doing their job, which is to teach these people exactly about the hazards of individual pesticides because they are also teaching them what pesticide to use for

what purpose and then to teach them also how to protect themselves.
Q. And do you have any knowledge --
MS. FORGIE: When you get -- we've been going over an hour. When it's convenient for you I'd like to take a biology break.
MR. LASKER: Let me just finish this.
MS. FORGIE: Of course.
BY MR. LASKER:
Q. Okay. Do you have in California or elsewhere, I don't care where it is, do you have an independent knowledge, Dr. Ritz, as to what instructions are for pesticide applicators with respect to the protective gear to be used while applying glyphosate to Roundup Ready crops?
MS. FORGIE: Object to the form. You can answer.
THE WITNESS: I wouldn't know exactly, but my guess would be that you use the usual precautions but not necessarily a respirator or any equipment that you would want to use for

highly volatile pesticides. It's more the general protective gear.
MR. LASKER: We can take a break.
MS. FORGIE: Thank you.
THE VIDEOGRAPHER: We are off the record at 2:05 p.m.
(Recess taken from 2:05 p.m. to 2:39 p.m.)
THE VIDEOGRAPHER: We are back on the record at 2:39 p.m.
BY MR. LASKER:
Q. Dr. Ritz, welcome back. We've been talking about the imputation method used in the AHS, and I want to just make sure we have a common framework so everybody sort of schematically understands what was done. So I created a sort of a visual. If I could, I'd like to walk through this with you.
(Exhibit Number 30-10 was marked for identification.)
BY MR. LASKER:
Q. I understand that you have criticisms of how the methodology worked with respect to glyphosate, but I wanted to make sure we have a common understanding of

what was done. So in the AHS they had the phase 1 survey which was from 1993 to 1997, and they obtained questionnaire responses from 54,251 members of the cohort; correct?
MS. FORGIE: I object to the form, and I object to the use of this that she has not reviewed, and it is drawn by counsel.
BY MR. LASKER:
Q. Dr. Ritz?
MS. FORGIE: Wait. Give her a few minutes to look at it, please.
MR. LASKER: Sure.
MS. FORGIE: Thanks.
THE WITNESS: So this shows that exposure data from both phases were used to impute exposure data on individuals who did not respond to phase 2, yes.
BY MR. LASKER:
Q. So I just want to walk through so other people can follow this. I know you understand this. I think I do. But the judge and the jury may have some difficulty.
MS. FORGIE: You meant me, didn't you?

BY MR. LASKER:
Q. We have the phase 1 survey from 1993 to 1997 and questionnaires were filled out by 54,251 members of the cohort; correct?
MS. FORGIE: Object to the form and the dates on there.
THE WITNESS: In that time period? Well, there were actually more responses, but those were the ones, I believe, that are used most of the time in the analyses because they clean out people from -- they drop people from analyses because they already had either disease at baseline or they missed other variables.
BY MR. LASKER:
Q. And then in the phase 2 survey as we've discussed, there were 63 percent of that group or 34,698 who filled out questionnaire responses in that phase 2 survey which was given in that 1999 to 2005 time period; correct?
MS. FORGIE: Again, I object to the form. This isn't a memory test. I

think she would have the publication in front of her, please.
THE WITNESS: Yeah, I do recall it was about 34,000 individuals who did respond to a CATI interview.
BY MR. LASKER:
Q. And then the imputation was with respect to the remainder which was the 19,553 who did not respond to the phase 2 survey, and we have that in the dotted line; correct?
MS. FORGIE: Again, I object to using these figures without her having access to the publication.
THE WITNESS: I imagine that that's the number of individuals, yes.
MR. LASKER: This will be 30-11, and this is the 2018 JNCI article; right?
(Exhibit Number 30-11 was marked for identification.)
THE WITNESS: Yes.
BY MR. LASKER:
Q. So if you look at page 3 results, you'll see among 54,251 participants.

That's the number we have for the cohort; correct?
A. Yes.
Q. And then on page 4 on the 2018 JNCI, again, they discuss in the column that goes down on that page the first indent in the primary analysis. Again, it's the 54,251 applicators.
Do you see that?
A. Yes.
Q. And then if you go down about halfway further down, you will see that there was 34,698 individuals who responded to both phase 1 and phase 2 questionnaires; correct?
MS. FORGIE: Object to the form.
THE WITNESS: Yes.
BY MR. LASKER:
Q. Okay. And then what was done with respect to the imputation methodology, and I know we have further questions about how it was done, but the imputation methodology takes questionnaire responses from the individuals who responded to phase 1, both the folks who then did respond to phase 2

and those who did not. And they also take questionnaire responses for the 34,698 individuals who responded to the phase 2 survey, and they use those questionnaire responses to impute exposure data for the individuals who did not respond to phase 2. That's the sort of the basic methodology; correct?
A. Yes. That's about the estimation procedure, yeah.
Q. And then they -- when forwarded in time for purposes of the 2018 NCI study to 2013 for health outcomes which in this case was cancer outcomes; correct?
A. They do what?
Q. They measure cancer outcomes going to 2012 or 2013 --
A. Depending on the state, yes.
Q. And the health outcome information, that is obtained from separate healthcare databases. It's not for the cancer outcomes in the 2018 NCI study; correct?
MS. FORGIE: Object to the form.
THE WITNESS: Correct.
///

BY MR. LASKER:
Q. You don't have any concerns about the reliability of the information on the cancer outcomes that were used for the 2018 NCI study; correct?
MS. FORGIE: Object to the form.
THE WITNESS: The cancer outcomes are pretty well documented in cancer registries. Of course, they assume that farmers stay within the states, but I know they also followed them for mortalities nationwide so they probably found most case.
BY MR. LASKER:
Q. And then this is -- so this is the overall analysis that was used, and I have it here and you can check on the 2018 NCI study, page 5, Table 2. I put in here at the bottom what the 2018 NCI study reports for the rate ratio for the highest exposure quartile for non-Hodgkin's lymphoma, and that's that 0.87 with confidence intervals of .64 to 1.2; correct?
MS. FORGIE: Object to the form. Mischaracterizes the data and the study.

THE WITNESS: It shows the highest exposure quartile compared with the non-exposed as the reference category.
BY MR. LASKER:
Q. And that's the number that's on the bottom on this table that I put up on the screen; correct?
MS. FORGIE: Object to --
BY MR. LASKER:
Q. 0.87, 0.64 to 1.2; correct?
MS. FORGIE: Object to the form. Mischaracterizes the data.
THE WITNESS: It's the same numbers.
BY MR. LASKER:
Q. Okay. Now the investigators then -- and this is discussed on page 4 of the paper -- do a number of sensitivity analyses. I want to walk through them and make sure we have a common understanding of what was done. So we'll mark this -- this is now 30-12.
(Exhibit Number 30-12 was marked for identification.)
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BY MR. LASKER:
Q. We'll put this on the screen and take a snapshot of that as well.
MR. LASKER: 30-Exhibit 11 was the 2018 NCI study. This is 30-12.
MS. FORGIE: And this one is 30-12. Okay.
BY MR. LASKER:
Q. So for 30-12, this is on page 4 of the NCI study, they talk about different sensitivity analyses that they conducted with their data; correct?
MS. FORGIE: And, again, I object to the use of this form created by counsel without her having a chance to review.
You can go ahead and review this in comparison to the study which is 30-11.
THE WITNESS: So where does this number come from?
BY MR. LASKER:
Q. That's the question I want to walk through with you. So on page 4 of the 2018 JNCI study, in the right-hand -- left-hand column, I'm sorry, they talk about that

indent in the primary analysis include exposure information --
MS. FORGIE: Wait, wait. Can you read it a little slower, please.
MR. LASKER: I'm just positioning you on the page.
MS. FORGIE: That's what I'm trying to find.
MR. LASKER: In the primary analysis. I'm just getting you in the right paragraph.
MS. FORGIE: Okay.
BY MR. LASKER:
Q. And then they talk about in the course of that paragraph a number of sensitivity analyses they conducted on the data; correct, Dr. Ritz?
A. Yes, they conducted sensitivity analyses and they describe them.
Q. So the first sensitivity analysis that they discuss is that they restricted the exposure data only to information that they obtained in the phase 1 questionnaire; correct?
A. Yes.

MS. FORGIE: Object to the form.
BY MR. LASKER:
Q. So that's what we have depicted here. So this is now just data information from the phase 1 questionnaire; correct? That's all actual questionnaire responses in phase 1 for the 54,251 individuals in the cohort; correct?
A. That's correct.
Q. And then from using only that actual questionnaire data, they then looked at the cancer outcomes related to those members of the cohort. And for their highest quartile of exposure, again, corresponding to the highest quartile exposure we looked at for the primary analysis, they reported that their rate ratio without using any of the imputed data was 0.82 with 95 confidence interval of 0.62 to 1.8; correct?
A. Yes.
Q. Okay. The second sensitivity analysis --
MS. FORGIE: By the way, I object to showing this in this way. This is a

much longer period of time.
MR. LASKER: I'm sorry. Which --
MS. FORGIE: Wait, let her explain.
THE WITNESS: This ten line, 30-12 but also 30-10. You can see that between 1974 and 1993 there's a broken line.
BY MR. LASKER:
Q. Right.
A. That reflects that we're leaving years out. But between 2005 and 2013 that's not the case. It looks like that time period is fairly small. It's not.
Q. That's fine. But the years that are actually written down here, 1974 to 1993, 1997, 1999, 2005, and 2013, those years are accurate; correct?
MS. FORGIE: Objection. She's already stated that 2000 -- well, objection. She's already stated there's a problem.
MR. LASKER: Objection is noted.
THE WITNESS: They are accurate to -- in a certain sense because they are also ignoring that one of the states

finished at 2012, not '13.
BY MR. LASKER:
Q. Okay. But other than that one date, the other dates are accurate on this --
A. Depending on what they depict. I don't know.
Q. I should clarify. 1974 is the date that glyphosate-based herbicides were first approved for use in the United States; correct?
MS. FORGIE: Object to the form.
THE WITNESS: Yes.
BY MR. LASKER:
Q. And in the phase 1 survey, the individuals who provided questionnaire responses were providing information on historical use of glyphosate, which at the maximum could extend back to 1974; correct?
MS. FORGIE: Object to the form.
THE WITNESS: Correct.
BY MR. LASKER:
Q. Do you have any other concerns with the -- how this first sensitivity analysis is depicted on this graph -- on this

graphic?
MS. FORGIE: Object to the form.
THE WITNESS: Actually, I'm objecting to how this is referenced.
BY MR. LASKER:
Q. Let's go back to that. I want to make sure I understand.
MS. FORGIE: Tell him the reference number.
THE WITNESS: It's 30-10.
BY MR. LASKER:
Q. Yes.
A. Because this image makes it look as if they reported for the whole period, and they clearly didn't.
Q. Okay.
A. So these individuals reported for the 12-month period depending on in which year they were interviewed. So we have gaps in exposure assessment.
Q. But the phase 2 survey was, and obviously we have to be able to look forward in the box. I understand that. But the phase 2 survey was provided during the years 1999 and 2005 and in that questionnaire the

individuals provided information for one reference year, their most recent year of pesticide use; correct?
MS. FORGIE: Object to the form.
THE WITNESS: The most recent year of farming, yes.
BY MR. LASKER:
Q. Okay. Let's go to 30 --
A. It's not pesticide use. That's important.
Q. It's farming.
A. It's farming.
Q. And then they provided responses with respect to pesticide use during that year?
A. Yes.
Q. Understood. 30-13 then is the second sensitivity analysis that was conducted in the JNCI.
(Exhibit Number 30-13 was marked for identification.)
MS. FORGIE: I don't think we have a 30-13.
MR. LASKER: Here. I don't think I handed that out. My mistake.

(Discussion off the record.)
BY MR. LASKER:
Q. This is the second sensitivity analysis they conducted in the 2018 NCI study was they only looked at the individuals who responded to both the phase 1 and phase 2 surveys; correct?
MS. FORGIE: Again, objection to using this 30-13 along with 30-10 and 30-12 created by counsel that she's never had a chance to look at, and I object to that.
THE WITNESS: It's the same number, so I imagine these are the individuals with the exposure data at baseline and for the 12-month period at follow-up.
BY MR. LASKER:
Q. And what the investigators did in the 2018 NCI study is looking solely at these questionnaire responses in phase 1 and phase 2. And, again, not looking at any imputed data, they calculated the rate ratio for non-Hodgkin's lymphoma from exposure to glyphosate going out to 2012 or 2013 and they found that for the highest quartile

exposure group, their rate ratio was 0.9 with confidence interval of 0.63 to 1.27; correct?
MS. FORGIE: Object to the form. When you're -- I notice it's saying NCI up at the top. Are you talking about the AHS study, the 30-11.
MR. LASKER: The 2018 publication in the "Journal of the National Cancer Institute," yes.
MS. FORGIE: I object to that as well.
MR. LASKER: That's fine.
THE WITNESS: So the comparison they make is always to the non-exposed.
BY MR. LASKER:
Q. Right.
A. And I actually object to that kind of comparison because Anneclaire DeRoos for a good reason did, she compared the highest to the lowest exposed because there's a certain number of confounding likely between the unexposed and those using glyphosate.
Q. We can talk about that, but I want to make sure I understand and the jury and

judge understands the sensitivity analysis that was conducted. For this sensitivity analysis, the investigators looked only at actual questionnaire response data from phase 1 and phase 2 for the members of the cohort that provided answers to both questionnaires; correct?
MS. FORGIE: Objection. And are you talking about 30-13 or 30-12?
MR. LASKER: This is 30-13.
MS. FORGIE: Okay.
THE WITNESS: So they are using actual data. However, that actual data has many, many holes as we know because they are only asking about a 12-month period and guess whatever happened in the interim when glyphosate use changed considerably.
BY MR. LASKER:
Q. But for this sensitivity analysis 2 using only actual questionnaire data for 34,698 individuals in the phase 1 and phase 2 survey, they found a rate ratio for the highest quartile of exposure of 0.9 at the rate of confidential of 0.63 to 1.27;

correct?
MS. FORGIE: Object to the form.
THE WITNESS: They found in highest quartile odds ratio or hazard ratio, I guess, comparing to the unexposed, and I have concerns about that as I have large concerns about using this data as if it's the truth. It's not.
BY MR. LASKER:
Q. Let's go to the next sensitivity analysis. This will be 30-14.
(Exhibit Number 30-14 was marked for identification.)
BY MR. LASKER:
Q. This document shows the third sensitivity analysis that the JNCI investigators conducted in their publication; correct?
MS. FORGIE: Object to the form and the reference as it is the third sensitivity analysis. Again, I object to counsel showing her a document that she's never had a chance to see before or compare.
THE WITNESS: Could you walk me

through what this is?
BY MR. LASKER:
Q. Sure. The third sensitivity analysis, and it's page 4 of the JNCI article. The investigators truncated their cancer incidence data. Instead of extending it out to 2013, they brought it back to 2005; correct?
MS. FORGIE: Objection. Object to form.
THE WITNESS: Yes, they excluded all cancer incidences after 2005.
BY MR. LASKER:
Q. So to the extent there were changes in exposure after 2005, either incidence or intensity, that information is no longer part of this analysis because the cancer now has a cutoff of 2005; correct?
MS. FORGIE: Object to the form.
THE WITNESS: Any exposure changes after 2005 would now be eliminated, but not any before.
BY MR. LASKER:
Q. Right. And using that sensitivity analysis when they looked at the rate ratio

in their highest exposure quartile, again, they found no association between glyphosate exposure and non-Hodgkin's lymphoma; correct?
MS. FORGIE: Object to the form. Mischaracterizes the data from the study.
THE WITNESS: Well, in this highest exposure quartile, we are finally on the right side of the equation. We get a 1.04 meaning it's not protected against NHL anymore and tells you they are starting to maybe look at the right follow-up period where they have the best data for which is really a very short period.
BY MR. LASKER:
Q. So is it your testimony, or let me make sure I understand. Is it your testimony that this analysis with a rate ratio of 1.04 confidence interval of 0.7 to 1.57 is suggestive of a causal link between glyphosate exposure and non-Hodgkin's lymphoma?
A. What I'm saying is that I don't

believe that we should all eat glyphosate in our cereal in order to prevent NHL. I do not believe any of these estimates are below 1. So we're finally getting to where I can imagine that some of the exposure misclassification and some of the confounding is not as strong anymore, and that's what this is indicating as it was in the other sensitivity analysis.
Q. So if I understand correctly, if the rate ratio is -- the point estimate of the rate ratio is above 1, you consider that could be more believable with a non-statistically significant finding than if the rate ratio is below 1 with a non-statistically significant finding?
MS. FORGIE: Object to the form. Mischaracterizes her testimony. Asked and answered.
You can answer it again.
THE WITNESS: What I think is that glyphosate is not protecting us against NHL. So any true estimate should either be 1 or above 1. Any estimate below 1 we have to explain unless we are willing

to agree that glyphosate prevents NHL.
BY MR. LASKER:
Q. Is it your testimony that any of the rate ratios reported in the 2018 NCI study are statistically significant evidence of a protective effect?
MS. FORGIE: Object to the form.
THE WITNESS: Of a protective effect?
BY MR. LASKER:
Q. Yes.
A. For glyphosate?
Q. Yes.
MS. FORGIE: Could you read the question back again, please.
THE WITNESS: I don't understand this.
BY MR. LASKER:
Q. I'll restate the question.
You're talking about the fact that the other rate ratios reported that we've looked at are below 1.
A. Uh-huh.
Q. None of those rate ratios are statistically significant; correct?

A. That's correct.
Q. And none of those rate ratios and nobody claims in the NCI study that any of those rate ratios are evidence of a protective effect for glyphosate; correct?
MS. FORGIE: Object to the form.
THE WITNESS: Well, in fact, some of your own experts seem to infer that in the way they wrote their reports.
BY MR. LASKER:
Q. Is it your opinion that any of Monsanto's experts are stating that the 2018 NCI study shows that glyphosate is protective against non-Hodgkin's lymphoma?
MS. FORGIE: Object to the form. Asked and answered.
You can answer.
THE WITNESS: So what I'm saying is that what is the -- what is the story here? Are we supposed to believe that estimates of .83 and .9 are reflecting the truth?
BY MR. LASKER:
Q. That was not my question. My question is is it your opinion or your

understanding of the expert report submitted by Monsanto's experts that Monsanto's experts are stating that the findings in the JNCI study are evidence of a protective effect of glyphosate against non-Hodgkin's lymphoma?
MS. FORGIE: Object to the form. Asked and answered.
You can answer it again.
THE WITNESS: They are not saying that explicitly, but the way they argue you would imagine that -- no. You have to actually assume they think that because of the way they argue.
BY MR. LASKER:
Q. Am I correct -- let me make sure I am. Your understanding is that you are -- strike that. Start again.
Is your testimony in that regard based upon the issue of non-differential exposure classification biasing findings towards the null?
A. I state that that is the most likely thing that might happen is non-differential exposure misclassification,

yes.
Q. I understand that it's your opinion that there was non-differential exposure misclassification in this study. Is it your belief that Monsanto's experts believe that there was non-differential exposure misclassification in the study?
MS. FORGIE: Objection. Object to the form. Also I think it would be helpful if she could look at the Heltshe Ryder reports or Acquavella. I don't know which experts you're referring to.
THE WITNESS: Which experts?
BY MR. LASKER:
Q. I'm sorry. This is something you stated. I want to understand the testimony you just provided. Is it your understanding that any of Monsanto's experts have opined that there was non-differential exposure misclassification in the 2018 NCI study?
MS. FORGIE: Object to the form, asked and answered.
THE WITNESS: They are trying very hard to say that's not the case.
///

BY MR. LASKER:
Q. And if there is no non-differential exposure misclassification in the JNCI study, then there is no biasing towards the null; correct?
MS. FORGIE: Object to the form.
THE WITNESS: That's not correct. There are many other biases that can move the estimate towards the one including confounding. That's not adjusted for.
BY MR. LASKER:
Q. Is it your understanding that the -- strike that.
Do you believe that there is bias in the 2018 JNCI study that is biasing the reported rate ratios away from the null?
A. Away from the null in what direction?
Q. Either direction.
A. Like below? Below the --
Q. Below or above.
MS. FORGIE: Object to the form.
THE WITNESS: There is certainly bias that is shown here that moves

estimates below the 1, yes. That's a biased estimate.
BY MR. LASKER:
Q. My question is can you identify for me any specific bias that you believe occurred in the 2018 JNCI study that you believe biased the reported rate ratio away from the null?
MS. FORGIE: Objection. Asked and answered.
You can answer it again.
THE WITNESS: Yes, indeed. Confounding is the most likely one because you're comparing an unexposed group that I believe is not in the sense of the causal inference that we try to make fully exchangeable with the exposed group.
BY MR. LASKER:
Q. So is the --
MS. FORGIE: Wait. Let her finish.
THE WITNESS: They have not adjusted for all the variables because we don't really know in every single way how these two differ.

The best way to actually check that is by using only exposed. That's what Anneclaire DeRoos did. She looked at the low exposure versus high exposure. She left it specifically because she was worried about that confounding. She left out the nonexposed.
BY MR. LASKER:
Q. My question to you is not whether you believe that it existed or not but what you can point to that you believe caused this. I just want to make sure I understand. You stated that you believe confounding led to a bias in the reported rate ratios away from the null; is that correct? Is that your testimony?
MS. FORGIE: Objection --
THE WITNESS: That is one --
MS. FORGIE: Wait.
Objection. Asked and answered.
You can answer it again.
THE WITNESS: It is one of the biases. Another one is random error.
BY MR. LASKER:
Q. Is it your testimony that random

error biased the rate ratio away from the null?
A. Correct.
Q. How did that happen in your opinion?
A. That is actually pointed out in the beautiful paper by M. Jurek and Sander Greenland that was in the list of your experts, and that they obviously must have misinterpreted.
Q. And the Sander Greenland article talks about bias away from the null when there is a bias that is associated both with exposure and disease outcome; correct?
A. No. This is non-differential, and they specifically called it non-differential. Non-differential can actually -- doesn't mean that it's just one kind of bias that ends at 1, that it actually -- because we are randomly sampling from exposure distribution, we could randomly also have estimates below the 1, and that's what they're showing.
Q. In the Sander Greenland article they state for that to happen, the

misclassification would have to be associated both with the exposure and the disease outcome; correct?
A. That's --
MS. FORGIE: Wait. Objection. I think it would be fair to show her the article. You're being very specific here.
MR. LASKER: It's her testimony.
BY MR. LASKER:
Q. Is it your testimony that Sander Greenland says there's exposure away from the null when there is no association?
MS. FORGIE: Wait. Objection. I still think you should show her the article. I don't think it's fair.
THE WITNESS: The article I read and I'm referring to was one on non-differential exposure misclassification, not differential.
BY MR. LASKER:
Q. Okay. And with respect to non-differential exposure misclassification for it to be a bias away from the null, there would have to be an association both

with exposure and with disease outcome; correct?
MS. FORGIE: Object to the form.
THE WITNESS: That is incorrect. That's the definition of differential exposure misclassification.
BY MR. LASKER:
Q. For a non differential exposure misclassification, you're not going to have bias away from the null; correct?
MS. FORGIE: Object to the form.
THE WITNESS: Incorrect. They are explicitly writing this article to show that under random error, strong random error in exposure misclassification that's non-differential, doesn't depend on disease, you can get a bias away from the null or across the null.
BY MR. LASKER:
Q. Let's take a look at your supplemental expert report at page 8.
MS. FORGIE: It's number --
MR. LASKER: 30-1.
MS. FORGIE: 30-1. You're right.
///

BY MR. LASKER:
Q. At page 2 of your report, the third paragraph on the page, you state "It is well known that faulty recall of past exposures leads to measurement error"; correct?
A. Yes.
Q. "In a cohort study this error contributes to non-differential exposure misclassification, i.e., it is as likely for those who remain healthy and those who later develop a disease to make mistakes and not recall and report exposures correctly."
Did I read that correctly?
A. Yes.
Q. And then on page 3 of your supplemental expert report, you state -- and now we're in the second paragraph, second full paragraph, and it is the second sentence in your expert report, "The error generated in cohorts and especially the AHS, agricultural health study, is considered non-differential such that there is no systematic difference between the error in reporting for those who later become cases, diseased, and those who remain healthy,

controls. This is by design in a cohorts since at the moment no one has a disease of interest such that remembering would be influenced by disease status."
Did I read that correctly?
A. That's correct.
Q. And then page 6 of your expert report at the end of the carryover paragraph, the last sentence, and you've underlined this, you state, "The combined impact of these two sources of non-differential exposure misclassification can strongly bias results towards the null, i.e., not finding a true association."
Correct?
A. Where is that?
Q. Page 6 underlined.
A. Yeah, yeah.
Q. In your supplemental expert report, and you've underlined this, you state "The combined impact of these two sources of non-differential exposure misclassification can strongly bias results towards the null, i.e., not finding a true association."
Correct?

A. Correct.
Q. And in no place in your supplemental expert report do you ever state that there was any bias in the 2018 study that you state biased the reported rate ratios away from the null; correct?
MS. FORGIE: Object to the form.
THE WITNESS: I'm not sure what you're saying.
BY MR. LASKER:
Q. There is no statement anywhere in your supplemental expert report in which you state that the errors that you opine occurred in connection with the 2018 NCI study biased the results away from the null.
MS. FORGIE: Object to the form. Mischaracterizes the report.
You can answer.
THE WITNESS: When you don't see a result, when you don't see a positive result for a risk factor, there's no reason to believe that it's biased away from the null. So there's no reason for me to comment on it.
///

BY MR. LASKER:
Q. Am I correct that there is no statement anywhere in your supplemental expert report in which you state that any of the errors that you opined exist in the 2018 NCI study biased the results away from the null?
MS. FORGIE: Object to the form. Mischaracterizes the report.
THE WITNESS: This is not what I was asked to do when I reviewed this report. So there's no reason for me to go into a bias that obviously doesn't exist because there's no association shown.
BY MR. LASKER:
Q. And there are numerous places in this report that you talk about biases that you believe exist in the 2018 NCI study that you believe biased the results towards the null; correct?
MS. FORGIE: Object to the form. Mischaracterizes the report.
THE WITNESS: I was asked to analyze the results with respect to

biases. That's what I did, and I gave my opinion about what non-differential exposure misclassification does in this study, correct.
BY MR. LASKER:
Q. Okay. The --
A. Not what it does, in general. What it does in this study.
Q. The 2011 -- let's mark this next in line.
MS. FORGIE: Where are we in time just out of curiosity, please.
THE VIDEOGRAPHER: 137.
MS. FORGIE: He's used up or remaining.
BY MR. LASKER:
Q. Let's go to the 1997 Acquavella memo.
MS. FORGIE: The memo?
MR. LASKER: This is something she cites in her report.
THE WITNESS: Can I just get myself a glass of --
MS. FORGIE: Hold on one second.
///

(Exhibit Number 30-15 was marked for identification.)
MR. LASKER: 30-17?
MS. SHIMADA: 15.
MR. LASKER: 30-15. Thank you.
BY MR. LASKER:
Q. Dr. Ritz, you cite this 1997 memo by Dr. Acquavella in your supplemental expert report; correct?
A. Correct.
Q. And in particular at page 4 of your expert report you quote from this report -- first of all, this report was drafted prior to the time when the AHS study resulted in any published epidemiological analyses of pesticide exposure in cancer; correct?
MS. FORGIE: Object to the form.
THE WITNESS: When was it?
BY MR. LASKER:
Q. 1997.
A. They started publishing quite soon, but I wouldn't be able to say whether it's exactly before.
Q. Have you looked to see whether there was any publication out of the AHS on

pesticide exposure in cancer prior to this memo?
A. I would imagine there isn't, but I can't say for sure that there isn't.
Q. And you quote this memorandum on page 4 of your supplemental expert report as identifying two problems with the exposure assessment in the AHS, and the first was that usage does not necessarily mean exposure (work practices, equipment, environmental conditions, determine exposure to a large degree); correct?
MS. FORGIE: What page are you on?
THE WITNESS: That's what it states, yes.
BY MR. LASKER:
Q. That's what you quote in your expert report on page 4; correct?
MS. FORGIE: Thank you.
THE WITNESS: Yes.
BY MR. LASKER:
Q. In the publications that came out of the Agricultural Health Study including the 2018 NCI study, they in their exposure classification take into account intensity

of exposure which includes variables on work practices, equipment, and protective gear; correct?

MS. FORGIE: Object to the form. Mischaracterizes.

THE WITNESS: The AHS made an attempt to take work practices and protective equipment gear into consideration. They went through -- to a large extent through an exercise of going out to farms and watching 20 to 30 farmers apply and take urine samples and then, you know, estimated with what they observed and what the urine samples showed, which type of application method and which type of protective equipment would be giving you the most protection so that you wouldn't find the metabolites of certain pesticides in the urine.

However, everything they did was with 20 willing people who were being observed and the algorithm they developed was for 56,000 applicators who reported use since 1974. Do we really

believe that what they are observing in 2003, let's say, reflects the intensity and the type of application and the protection, even the protective equipment that would have been used by a farmer in the '80s?

BY MR. LASKER:

Q. My question though -- I think you've answered it -- is that this concern that Dr. Acquavella raised in 1997, the AHS investigators at least attempted to address -- and I understand you have concerns about how well they did that. Is that fair?

MS. FORGIE: Objection. Asked and answered as you just stated.

You can answer it again.

THE WITNESS: Well, the intensity estimation that they conducted may work in certain circumstances and may not work in others, and we really don't know in which they do and they don't. What we know is the protective equipment changed and that the application methods changed and, therefore, for the

pesticides that were around for a long time and were used changed, both changed the most. There are other pesticides that are kind of stable or discontinued and whatever they reported at baseline might be quite correct.

BY MR. LASKER:

Q. The other criticism that you quote Dr. Acquavella making back in 1997 was that recall can be faulty, and he talks about attempts at verification of recall information on pesticide exposure; correct?

MS. FORGIE: Object to the form.

THE WITNESS: He states that, yes.

BY MR. LASKER:

Q. Subsequent to the date of this Acquavella memorandum, the AHS investigators conducted a number of studies including repeat questionnaires to assess the accuracy of the recall information in the AHS questionnaire for exposures to pesticides; correct?

A. They attempted to do that, yes.

Q. Okay. The -- you have, in fact, in your own research used intensity factors in

determining exposure -- exposures to pesticides; correct? For epidemiological research?

MS. FORGIE: Object to the form.

THE WITNESS: Actually we used Dr. Dosemeci's scheme, and we also -- we actually did three different types of analyses where we used Dr. Dosemeci's scheme, a scheme from someone else as well as without weighing for intensity at all, and interestingly, our own results were stable and showed exactly the same results for Parkinson's disease whether or not we used intensity. However, these -- that was a case control study, and it's very different in terms of exposure assessment from the AHS.

BY MR. LASKER:

Q. Is -- and just to make sure we have this correctly, this is Exhibit 30-16.

(Exhibit Number 30-16 was marked for identification.)

BY MR. LASKER:

Q. This is the publication -- is that

the publication you had in mind?
A. Yes.
Q. And in this publication when you presented -- in this presentation you used a measures of intensity and then as reported on page 247, you set forth your analyses of associations between Parkinson's disease and pesticide exposures based upon various exposure quartiles; correct?
MS. FORGIE: Object to the form.
BY MR. LASKER:
Q. Tertiles.
A. Yes.
MS. FORGIE: Give her a chance --
BY MR. LASKER:
Q. What you set forth in your analysis was dosing based upon three exposure tertiles with odds ratios that were then compared to no exposure; correct?
MS. FORGIE: Object to the form and take your time to review it.
THE WITNESS: Yes, that's correct.
BY MR. LASKER:
Q. In discussing your findings on page 244, and then it goes over to 246, on

page 244, among Parkinson's disease case control, and then continuing to 246, studies, a majority, however, relied on retrospectively self-reported occupational pesticide exposures solely based on expert assessment and job titles to construct exposure matrixes underscoring a lack of studies using exposure assessment methods that might not be affected by recall bias; correct?
A. Correct, in a case control study, yes.
Q. On page 248 in your study on the second column the second paragraph you state, "A limitation of our study we did not record usage of personal protective equipments with the occupational history which might modify pesticide exposure levels"; correct?
MS. FORGIE: Where is it?
THE WITNESS: Yes. Of this study.
MS. FORGIE: I see it. Thank you.
BY MR. LASKER:
Q. Dr. Ritz, if I understand -- let me make sure I understand correctly. Do you

believe that the epidemiologic -- strike that.
In your opinion, does the 2018 NCI study strengthen or weaken the epidemiological evidence in support of your opinion that there is an association between glyphosate-based herbicides and non-Hodgkin's lymphoma?
A. It does not change my opinion at all because it shows exactly what I predicted due to their severe exposure misclassification for glyphosate.
Q. Do you believe the 2018 NCI study has any weight in the evaluation of whether glyphosate-based herbicides caused non-Hodgkin's lymphoma?
A. It doesn't have it for me.
Q. At the end of your supplemental expert report you state that it would be inappropriate to include the 2018 NCI study in a meta analysis of glyphosate epidemiologic study; correct?
A. It depends on what you're trying to say. I learned that meta analyses -- and this is Dr. Greenland who wrote the bible in

epidemiology can be used in different ways, and the least informative way is to create a summary estimate across every study in the book because that just gives you a summary estimate that might be highly biased because studies are of very different quality.
So the way you should be using meta analysis is by grouping studies according to their design and their qualities in terms of exposure assessment, in terms of the possible selection bias, in terms of a lot of different bias-related issues and then use that to inform your opinion overall which type of study and which type of result you trust more.
Q. In your -- and maybe I misunderstood this. In your initial expert report in this litigation, you cited to a number of meta analyses that had been conducted prior to the 2018 NCI study and as you noted in your expert report, prior to the results for the NAPP which is the North American Pooled Project.
A. Right.
Q. Do you rely upon the summary

findings in those meta analyses -- do you now rely upon the summary findings in those meta analyses as support for your opinion that there is an association between non-Hodgkin's lymphoma and glyphosate-based herbicides?

MS. FORGIE: I'm going to object to the form. We're not here to talk about her original expert report. That's beyond the scope of this deposition. I'm going to let her answer this one. We're not going to go into her original expert report which you've already deposed her on for seven hours.

THE WITNESS: As a scientist, I never rely on any summaries. I usually go to the original data and look at it and then actually try to judge each piece of work on its own merit.

BY MR. LASKER:

Q. Okay. Fair enough. Let's take a break and I'm going to review my notes.

THE VIDEOGRAPHER: This marks the end of videotape number 1 in the deposition of Dr. Beate Ritz. We're off

the record at 3:27 p.m.

(Recess taken from 3:27 p.m. to 3:59 p.m.)

THE VIDEOGRAPHER: We are back on the record. This marks the beginning of videotaped number 2 in the deposition of Dr. Beate Ritz. You may proceed.

MR. LASKER: Thank you.

BY MR. LASKER:

Q. Dr. Ritz, we were talking previously about non-differential exposure misclassification, and the investigators who worked on the AHS study in 2011 prepared an analysis of the impact of this type of non-differential exposure misclassification on estimates of relative risk in the AHS; correct?

A. Let me see. They are specifically doing this for 2,4-D chlorpyrifos to evaluate their algorithm.

Q. Right. But what the article is about is addressing the possibility of bias that can be created in their study through non-differential exposure misclassification; correct?

MS. FORGIE: Object to the form.

THE WITNESS: For two pesticides that are not glyphosate and did not have the same change as glyphosate has, yes.

(Exhibit Number 30-17 was marked for identification.)

BY MR. LASKER:

Q. And then in -- on page -- you've seen this article before; correct?

A. No.

Q. Let's go back to your -- I'm sorry. Exhibit 30-1.

In your reference list in your supplemental expert report you cite to this study; correct?

A. That's the wrong one in here.

MS. FORGIE: That may have been my fault. That was my fault. I'm sorry.

BY MR. LASKER:

Q. Which Blair publication -- we don't have to do this on the record. You can correct me.

A. It's a different one. 2002-'05. Right?

Q. We'll deal with this later. I

understand now. Let me ask you with respect to what is the Exhibit Number 30- --

A. 17.

Q. On page 539 in the Blair 2011 paper, the AHS investigators set forth --

MS. FORGIE: What's the number on that one? I'm sorry. 30-17.

MR. LASKER: 30-17.

BY MR. LASKER:

Q. The AHS investigators and Dr. Blair set forth various scenarios where non-differential misclassification could create bias in the reported rate ratios in epidemiological studies coming out of the AHS cohort; correct?

A. That is incorrect. What they're doing here is actually comparing the algorithm of the AHS to urinary level active metabolize that they're measuring pre and post application, and that's a very different scenario from what actually the AHS did. They're estimating long-term exposure.

Q. Let me walk you through on page 540. Let me take a step back. One of

the issues that they're dealing with with respect to correlation with urinary levels is that could lead to exposure misclassification in the AHS study. That's one of the issues they're considering; correct?

MS. FORGIE: Object to the form.

THE WITNESS: They are considering whether the algorithm they are using for application type and for protective equipment used is actually accurately reporting -- related, is accurately related to metabolize their measuring pre and post exposure because they're using certain weights to define these intensities. So they're observing farmers while they are applying with their usual methods, and they're collecting the urine pre and post. They also gave them a questionnaire at the end of the day that asked them exactly the same questions the AHS asked but for a 24-hour period. And then they're correlating, and that's all in the other paper. Then they're correlating -- or

in the Coble Bay paper, in a number of papers. And then they are correlating what they see in the urinary levels to the estimated effect for 24 hours. So all they're evaluating here is a 24 hour -- or validating is a 24-hour correlation between a urinary metabolite and an application method and personal protective equipment use.

BY MR. LASKER:

Q. Can I take to you the abstract of this publication on the first page. In the conclusions here in the abstract it states "Although correlations between algorithm scores and urinary levels were quite good, i.e., correlations between 0.4 and 0.8, exposure misclassification with still bias relative risk estimates in the AHS toward the null and diminished study power."

Do you see that?

A. Yes, I see that.

Q. So that is the issue of as you talk about in your expert report the possibility of a non-differential exposure misclassification biasing reported rate

ratios in AHS studies towards the null; correct?

MS. FORGIE: Object to the form.

THE WITNESS: It's the general -- it's the general way that these estimates might be biased, yes.

BY MR. LASKER:

Q. And if you can turn to page 540 --

A. And that's their own conclusion here.

Q. Right. I understand. I just read it.

A. Yeah, exactly.

Q. If you can turn to page 540 of Dr. Blair's 2011 article, and on the second column he discusses several conclusions can be drawn from evaluation of the impact of exposure misclassification on an estimated relative risks in the agricultural health study. Do you see that in the second column at the top?

A. Several conclusions, yes.

Q. The first that they state is --

A. I need my glasses.

Q. That's fine.

"First, the correlation between questionnaire or observer information on pesticide use in measured urinary levels are in the range found for other factors that are usually considered to be reliably obtained for epidemiologic studies such as tobacco and alcohol use, diet, physical activity and health assessments"; correct?

A. Yes, but that refers to a 24-hour period. It doesn't refer to any long-term 40, 30-year period.

Q. Right. And you are also aware through the Blair 2002 study which is a different analysis when they looked at questionnaire responses taken a year apart, the same person filled out a questionnaire and then a year later filled out a questionnaire response, they similarly found that the information that they were obtaining on pesticide exposure -- the consistency was similar to what they were finding for these other factors such as tobacco and alcohol use; correct?

MS. FORGIE: Object to the form. Also I think it would only be fair to

let her see the 2002 article.
THE WITNESS: It's actually quite different what I remember. What I remember is that they had a general good agreement for yes/no which was 83 percent. However, when they went and asked about duration and intensity, the agreement was 53 percent for glyphosate, meaning 47 percent got it wrong. In one year. In one year. So we don't even talk about 30 years.
BY MR. LASKER:
Q. And we can go back to the 2002 study if we have time, but in your understanding of what it meant to get it wrong, do you recall again what the investigators reported as far as how far off those individuals were with respect to the year of exposure or the duration of exposure as reported in that paper?
A. That is not that paper. That was, I think, a Jane Hoppin paper where they looked at the first use and the duration. Jane is a very good friend, and that's not her best paper because all this paper says

is that these people who came for a pesticide applicator exam actually knew when pesticides were introduced to the market. And that doesn't tell you whether they remember exactly or even closely to when they themselves started using certain pesticides.
Q. I know there's also a separate paper with Dr. Hoppin. But I was actually asking about the Blair 2002 paper, but if you don't recall, I'll just move on. Do you recall in that paper whether when they discussed the correlation for duration that they found an average day's use that they found for the glyphosate if they reported the degree to which those who did not agree or in disagreement?
MS. FORGIE: Objection. Again, I think it's only fair to show her the paper if you're asking specific questions about specific numbers.
BY MR. LASKER:
Q. If you don't recall, that's fine. I'll just move on.
A. Yeah.

Q. You don't know the answer to that?
A. No.
Q. Continuing with this 2011 Blair publication, they then write "Second exposure estimate from an algorithm based on several determinants thought to affect exposure are more highly correlated with measured levels of these pesticides in the urine than some individual determinants" -- and they list some -- "and would result in less attenuation of relative risks"; correct?
A. Yes.
Q. Okay. Then they talk about the possibility of bias towards the null under various scenarios.
Do you see that?
A. Yes, they show that even if the relative risk was 3, they would calculate -- the true risk was 3, they would calculate a relative risk of 1.1.
Q. As low as 1.1. And then they continue if it was -- if the real relative risk was 2.0, what a non-differential misclassification bias towards the null

would do; right?
MS. FORGIE: Object to the form. Are you reading from it?
THE WITNESS: It's depending on which correlation size they have, yes.
BY MR. LASKER:
Q. And then if you go down further on the page, further in that column, for example, if the correlation between algorithm exposure intensity scores and measured urinary levels was 0.4 and the true relative risk was 3.0, the observed relative risk would be between 1.3 and 1.9 when sensitivity is in the 60 to 80 percent range. Do you see that?
MS. FORGIE: Where are you reading from?
THE WITNESS: Yeah, that's what they say.
BY MR. LASKER:
Q. If you can turn back now to page 539 --
MS. FORGIE: Hold on one second.
MR. LASKER: Page 540.
///

BY MR. LASKER:
Q. Turn back to page 539, the chart you're looking at previously, the first row of those charts is showing if the true relative risk was 3.0, and they are providing various calculations of the degree to which that true rate ratio of 3.0 could be biased towards the null under various scenarios of sensitivity and specificity and correlation; correct?
A. Right.
MS. FORGIE: Object to the form.
BY MR. LASKER:
Q. So then if we can turn back now to page 540 and follow along that same place that we were looking at --
A. Yes.
Q. -- they state for a true relative risk of 2.0, the observed relative risks from correlations of 0.2 or 0.4 never rise above 1.4; correct?
A. That's what it says.
Q. And then if you go back then to page 539, this is the second row of these tables looking at a true rate ratio of 2.0

and the possible impacts of a non-differential misclassification biasing those results towards the null for a whole host of different possible specificities and sensitivities and correlation levels; correct?
A. Not a whole host.
MS. FORGIE: Object to the form.
BY MR. LASKER:
Q. So they have correlations of either 0.2, 0.4, or 0.7?
A. Right.
Q. They have sensitivities going from 0.5 to 1.0, and they have specificity of either -- of three various -- of three levels; correct?
A. Correct.
Q. And then finally if you can return to page 540, they state from -- for true relative risks of 0.5, correlations from 0.2 to 0.4 between exposure estimates and measurements yield estimates of relative risk between 0.7 and 0.9; correct?
A. That's correct.
Q. If you go back to page 539, and

that is the third row of the charts that are presented on that page; correct?
A. Yes.
Q. And depending on the degree of correlation, depending on the specificity and depending on the sensitivity of their exposure measures, there is different levels of bias towards the null that can occur from this type of non-differential exposure misclassification; correct?
A. I don't see specificity. There's only sensitivity.
Q. Okay. With the three -- okay. Let's say, I'm sorry, correlation, and sensitivity. You're right. Not specificity.
A. Right.
Q. But the three different charts -- PX equals 0.7, PX equals 0.4, PX equals 0.2, those different columns would then be --
A. Different exposure --
MS. FORGIE: Wait, wait.
THE WITNESS: Prevalences.
BY MR. LASKER:
Q. Different exposure prevalences,

thank you.
Depending on these various different possibilities, there's various degrees of non-differential exposure misclassification that can result in various degrees of biassing towards the null; correct?
A. Yes.
Q. In none of the scenarios that they examined in this paper for the AHS for non-differential exposure misclassification did they find any situation in which the bias would be past the null --
A. Okay.
Q. -- in the other direction?
A. Correct. Because they don't assess random error in doing these, and they do not -- they assume that there's no other bias.
Q. For the AHS investigators in their published publication when they looked at non-differential misclassification and they reported their findings, they did not report any findings which would lead to what you believe happened in the 2018 NCI study; is

that correct?
MS. FORGIE: Object to the form. Asked and answered.
You can answer again.
THE WITNESS: What I see here is a simulation that we do a lot in epidemiology. I sometimes make my students do this, that shows what the potential non-differential misclassification of exposure would do under scenario of different exposure prevalences and sensitivity specificity and true relative risk, assuming there is no other bias neither confounding nor selection nor any differential misclassification and no random error because there's no confidence interval.
BY MR. LASKER:
Q. Understood.
A. And when you have random error with confidence interval, you will see that it crosses very easily the one.
Q. Understood. And the random error when the confidence interval cross -- where you say will cross over the 1 --

MS. FORGIE: With the what?
MR. LASKER: The random error in which you have confidence intervals which you believe would cross over the 1 you testified --
THE WITNESS: No, no.
MS. FORGIE: Wait for the question. Sorry.
BY MR. LASKER:
Q. If I understand correctly then, the point estimate would not cross over the 1, but there would be the possibility of error that could go below -- that could cross over the 1. Is that your testimony?
MS. FORGIE: Object to the form.
THE WITNESS: No, that's incorrect. We are pretending that any study that we are having like the AHS is just -- is getting -- okay. It is actually what Jurek and Greenland tried to describe. We are pretending that a study estimates without random error. Once we put random error in then whatever the point estimate in the -- within the confidence interval is under multiple repetitions

can very well lend under 1.
BY MR. LASKER:
Q. And if I understand correctly --
A. So it's not just the confidence level.
Q. If I understand correctly then, the general expectation is that it would bias towards the null, but there is still the possibility through random error that it might not. Is that fair?
MR. BAUM: Object to the form.
THE WITNESS: Random error in one -- of exposure misclassification may make a point estimate in a study land on the opposite side of the 1, yes.
BY MR. LASKER:
Q. The general expectation would be if you repeat these studies over and over again, most of the time you're not going to have that, but with random error sometimes you might?
MS. FORGIE: Object to the form.
THE WITNESS: That's what the paper says, yes.
///

BY MR. LASKER:
Q. Okay. Let's look at Gray 2000.
(Exhibit Number 30-18 was marked for identification.)
BY MR. LASKER:
Q. What is this marked?
MS. SHIMADA: 18.
BY MR. LASKER:
Q. This is a paper that I believe this one you have seen; correct?
A. Yes, yes.
Q. You cited this one in your paper?
A. Yes.
Q. And this is one of the publications you cite to -- --
MS. FORGIE: Wait. Did you give me a copy of it?
MR. LASKER: I believe so.
BY MR. LASKER:
Q. This is one of the publications that you cited to that had -- for criticisms of the AHS; correct?
A. Yes.
Q. Okay. This paper was written in 2000; correct?

MS. FORGIE: Object to the form.
THE WITNESS: Yes, it was published in 2000.
BY MR. LASKER:
Q. Published in 2000. We can reaffirm this. I've gone through the agricultural health study publication list, but are you aware of any publication out of the AHS cohort that provided findings for an epidemiologic study for exposure between any pesticide and a cancer outcome that was published prior to this Gray paper?
MS. FORGIE: Object to the form.
THE WITNESS: I'm not certain.
BY MR. LASKER:
Q. Okay. Now, the Gray 2000 paper is discussing a wide variety of different types of epidemiologic studies that were anticipated in the future using AHS data including both cohort studies, case control studies, and cross-sectional studies.
A. Yes.
Q. And various different types of cancer and non-cancer outcomes; correct?
A. That's correct.

Q. And on page 50 in this publication -- you're right.
MS. FORGIE: I had to use my own copy. This is 30-18? Thank you.
BY MR. LASKER:
Q. On page 50 at the top in that first full paragraph that starts "The design and implementation," about four lines -- five lines in --
MS. FORGIE: Read as much as you want.
BY MR. LASKER:
Q. Gray and his co-authors state, "As we emphasize below, we are particularly enthusiastic about the prospective cohort study of cancer outcomes because it responds directly to some of the methodological weaknesses of prior epidemiologic studies of farmers and pesticides"; correct?
A. That's what it says.
Q. And at page 47 in the introduction in the abstract, they explain the purpose for their paper in 2000. The first paragraph --
MS. FORGIE: What page are you on

again?
MR. LASKER: First page of the paper, page 47. The abstract.
MS. FORGIE: Thank you.
BY MR. LASKER:
Q. In the first paragraph the end of the paragraph they state, "In this report, we examine the design of the AHS, identify important program strengths and flaws, suggest various improvements in the program, and recommend ancillary studies that could be undertaken to strengthen the AHS"; correct?
A. Yes.
Q. And then on page 67 they start going through their recommendations, summary of research recommendations for the AHS; correct?
A. Yes.
Q. The first recommendation that Gray and his co-authors provide deals with assessing the validity of self-reported health outcomes; correct?
A. Yes.
Q. And for the 2018 NCI study, they're

not using self-reported health outcomes. They're using cancer data from registries; correct?
A. Yes, for cancer it's always registries.
Q. So we can agree that this recommendation is not relevant to the 2018 NCI study; correct?
MS. FORGIE: Object to the form.
THE WITNESS: For the health outcome cancer, it's not.
BY MR. LASKER:
Q. So the second recommendation is -- deals with exploring the reliability and validity of pesticide use data; correct?
A. Yes.
Q. And in the second sentence in that recommendation, one of the things they recommend, a simple and pertinent step would be to re-administer the questionnaire to a sample of respondents to see how much the answers change; correct?
A. That's what it says.
Q. We already talked about this and now we will have a chance to look at it, the

NAH investigators who were doing the AHS study, in fact, did that analysis in a publication by Blair in 2002; correct?

MS. FORGIE: Object to the form.

THE WITNESS: There is a Blair 2002 paper that I read that reports on readministered questionnaires, that's correct.

BY MR. LASKER:

Q. So let's mark that.

(Exhibit Number 30-19 was marked for identification.)

BY MR. LASKER:

Q. For the record Blair 2002, "Reliability of Reporting on Lifestyle and Agricultural Factors by a Sample of Participants in the Agricultural Health Study from Iowa"; correct?

A. That's correct.

Q. And in the abstract of this publication, Dr. Blair and his co-investigators write, and it's the last sentence of the abstract, "Levels of agreement regarding pesticide use in this population is similar to that generally

found for factors typically used in epidemiologic studies such as tobacco use and higher than typically reported for diet, physical activity, and medical conditions"; correct?

A. That's correct.

Q. And if you turn to page 96, this is where you were discussing the issue of -- well, first of all, on page 95, Table 1, this is the reliability or the correspondence for glyphosate which I think you actually gave an extra point. It was 82 percent agreement from one questionnaire to the other for never ever use; correct?

A. Yes, but the Kappa is .54.

Q. And then on Table 2, I believe you're talking about the issue of correlations for years mixed -- days per year mixed and decades first applied; correct?

MS. FORGIE: Object to the form.

THE WITNESS: Years mixed and applied, days, years, mixed and decade first applied, yes.

///

BY MR. LASKER:

Q. And in the text underneath that Table 2 --

A. Oh, one thing. These are not correlations. These are exact agreements and proper statistics. Not correlation.

Q. Exact agreements. That gets to the next point I was trying to make which we were talking about earlier. Under this Table 2 they talk about exact agreements and the various numbers that they get and they note, for example, "In addition, exact agreement for years, days per year, and decades of use of specific pesticides was generally in the 50 to 70 percent range which was lower than for dichotomous outcomes such as ever/never use"; correct?

A. I can't see it.

MS. FORGIE: Take your time.

BY MR. LASKER:

Q. Table 2, there is the text "exact agreement."

Do you see that?

A. Yes.

Q. If you read down the second

sentence or third sentence "In addition" --

A. Yeah, yeah.

Q. Okay. "Exact agreement for years, days per year, and decades of use of specific pesticides was generally in the 50 to 70 percent range which was lower than for dichotomous outcomes such as ever/never use," and that's what you were discussing earlier; correct?

A. Correct.

Q. Then they state 90 percent of the subjects gave responses within one category of agreement on the two questionnaires; correct?

A. Yes.

Q. So while there was 50 to 70 percent exact agreement, where there was not exact agreement, 90 percent of them or overall 90 percent of them were still within one category of agreement; correct?

MS. FORGIE: Wait. Object to the form.

THE WITNESS: That is correct. However, these categories are quite broad. So the -- this agreement can be

quite -- I mean, they can guess quite a bit.
BY MR. LASKER:
Q. Do you know what the categories are?
A. Yes. They are one year, five to ten -- four to five years, five to ten years, and then ten to twenty. So depending on what we're talking about, if it's years mixed and applied, et cetera.
Q. And days per year, do you know what those categories are?
A. Decades, days per year -- the decades were really decades. So --
Q. And days per year? Do you remember the categories?
MS. FORGIE: Hold on. Give her a second.
THE WITNESS: It was something like one to ten, and then there was I think the highest category was 50 plus.
MS. FORGIE: Take your time. Don't feel rushed.
BY MR. LASKER:
Q. With respect to the exact agreement

even with the years mixed, the days per year, the decades first applied, if you look at the second column on 96 towards the bottom in the text when they looked at vegetable servings per day and fruit servings per day, glyphosate still did better; correct?
MS. FORGIE: Object to the form.
THE WITNESS: Yes, I'm not surprised because vegetable servings per days and fruit servings per days change a lot, and it depends on when you ask these. Seasonal.
BY MR. LASKER:
Q. Let's go back to the 2011 -- I'm sorry, the 2000 Gray report.
MS. FORGIE: Hold on a second. We're putting the 19 away?
MR. LASKER: Yeah.
BY MR. LASKER:
Q. And the next category that they talk about deals with understanding the relationship between exposure surrogates and exposure, and that's on the next recommendation from Gray, et al., on page 68

of their paper; correct?
MS. FORGIE: Hold on a second.
THE WITNESS: Exposure surrogates and exposure, yes.
BY MR. LASKER:
Q. Okay. And in this recommendation they are recommending that biomonitoring studies be conducted to better understand the relationship between exposure surrogates and exposure; correct?
A. That's what they recommend.
Q. And as we've already discussed, and I think you've already mentioned the NIH investigators who were conducting research with the agricultural health study subsequently did do a number of biomonitoring studies of the type that was being recommended here; correct?
MS. FORGIE: Object to the form.
THE WITNESS: They did biomonitoring of current time in a very small subset of less than a hundred people among 56,000 workers -- 56,000 applicators that they asked these questions about including questions that

went back as far as '74, and we agreed before that practices change. So whatever that biomonitoring shows may or may not represent what changed.
BY MR. LASKER:
Q. I understand. But Gray, et al., in the 2000 paper were recommending that the investigators who were conducting research with the AHS study conduct biomonitoring studies and the investigators in the AHS then followed up and conducted biomonitoring studies; correct?
MS. FORGIE: Objection. Asked and answered.
You can answer it again.
THE WITNESS: I'm not certain that they're following these recommendations. They may have decided on their own that they needed biomonitoring studies.
BY MR. LASKER:
Q. That's fair. That's fair.
The next recommendation that the Gray investigators have in their 2000 paper is assessing the biological plausibility of any association; correct?

A. Yes.
Q. And while we may disagree with what the assessment is of biological plausibility in this case, it is fair to say that by the time of the 2018 NCI study, there are extensive studies by which one could address the issue of biological plausibility between glyphosate-based herbicides and non-Hodgkin's lymphoma; correct?
MS. FORGIE: I'm sorry. I just see these hands in the air. What are the fingers?
MR. LASKER: Eight minutes left, I think.
THE WITNESS: Now I'm confused. Say it again.
BY MR. LASKER:
Q. By the time of the 2018 NCI study was conducted, there was a body of scientific evidence --
A. It's not an NCI study. It's the AHS study published in the Journal of NCI.
Q. At the time of the study in the Journal of NCI was published in 2018 on glyphosate-based herbicides and cancer

generally, there is a full body of evidence by which the investigators can look at this issue of biological plausibility. They may reach different conclusions but the evidence is in existence; correct?
MS. FORGIE: Object to the form.
THE WITNESS: They would have looked at biologic evidence, yes, and there is some biologic evidence, but I don't know what they looked at because it's not, you know --
BY MR. LASKER:
Q. That's fair enough.
So then the next recommendation in the Gray paper is analysis and statistical issues; correct?
A. Yes.
Q. And the Dr. Gray states, second paragraph, "The general study plan of the AHS is not yet detailed enough to support a confident evaluation of the technical strengths and weaknesses of this major undertaking, and we recommend substantial efforts towards developing such a plan, the level of effort of detail we are suggesting

here would be typical of a major investigation, investigator initiated proposal that is peer-reviewed and judged to be worthy of funding by the National Institutes of Health"; correct?
A. That's what it says.
Q. In the 18 years that have followed the Gray paper, the AHS investigators have published over a hundred -- maybe over 200 different peer-reviewed publications coming out of that cohort; correct?
MS. FORGIE: Object to the form.
THE WITNESS: They have published a lot.
BY MR. LASKER:
Q. And they have continued to go back to NAH to receive additional funding; correct?
MS. FORGIE: Object to the form.
THE WITNESS: They actually had a lot of difficulty getting funding.
BY MR. LASKER:
Q. They have continued to receive continued funding from NAH; correct?
MS. FORGIE: Object to the form.

Asked and answered.
You can answer it again.
THE WITNESS: There are different ways of getting funding. One is internal funding and one is external funding. The internal funding is not reviewed in the same way as external funding. For the maintenance of the cohort, they got internal funding that is not as peer-reviewed as any study that would be external.
BY MR. LASKER:
Q. Okay. And as we discussed in our -- over the course of the deposition here today, the AHS investigators also did a variety of different -- conducted a variety of different analyses in separate studies to look at possibilities of exposure misclassification. They did biomonitoring studies and within the 2018 NCI studies, they conducted a variety of sensitivity analyses; correct?
MS. FORGIE: Object to the form.
THE WITNESS: They have attempted as much as they could to wrap their mind

around potential exposure misclassification. It doesn't mean that they succeeded and it didn't mean they succeeded for every pesticide.

MR. LASKER: Take a break. I've got three minutes left. I'm going to see if I've got three minutes of questions.

THE VIDEOGRAPHER: We are off the record at 4:35 p.m.

(Recess taken from 4:35 p.m. to 4:48 p.m.)

THE VIDEOGRAPHER: We are back on the record at 4:48 p.m.

MR. LASKER: I'm going to reserve my remaining 3 minutes and 30 seconds. I have no further questions unless there's questions from plaintiff's counsel.

MS. FORGIE: Okay. Let's take a break. I didn't know. I thought you were going to --

THE VIDEOGRAPHER: We're off the record at 4:48 p.m.

(Recess taken from 4:48 p.m. to

5:31 p.m.)

THE VIDEOGRAPHER: We are back on the record at 5:31 p.m.

MS. FORGIE: Counsel said he has a statement to make.

MR. LASKER: Yes. By my count, counsel has been off with the expert witness for 42 minutes since the close of my questioning, and that's on top of another 13-minute period of time they spent when I took the break with only a couple minutes left in my deposition time. Certainly both parties have extended the other side reasonable time to sort of gather their notes and prepare for whatever additional questioning they have, but this is excessive and we object to the amount of time that's been spent in that effort. So, again, noting for the record the amount of time spent and our objection to the line of questioning given this amount of preparation that's obviously been put into it, I will now tender the witness.

MS. FORGIE: Well, I completely disagree with the way that the break time was interpreted in your statement because when we took the break, I thought you were going to come back and ask more questions. That was the implication. So we took a break for you to gather your thoughts and use the last -- what I thought was using the last of your three-and-a-half minutes, and instead when we came back you said I'm going to reserve those three-and-a-half minutes at which point we took a break to prepare.

MR. LASKER: I understand. And that subsequent break was 42 minutes.

Go ahead.

MS. FORGIE: Whatever.

EXAMINATION

BY MS. FORGIE:

Q. Doctor, you were asked a series of questions about whether the same imputation method was used for other AHS publications that were peer-reviewed. Do you remember

those series of questions?

A. Yes, I do.

Q. Does the use of imputation in these studies make the use of imputation for glyphosate more reliable?

A. Absolutely not.

Q. Can you explain why not?

A. You can use the same method, but you're trying to impute a different type of exposure, and it really depends on the type of exposure that you're trying to impute whether the mechanism will work. So a generic imputation mechanism should be considered valid within the confines of what you're trying to predict. So that imputation mechanism may work very well when there is non-time varying exposure, and you have a lot of variables that can predict this exposure, but it doesn't work if there's a lot of change in time varying exposure, and you have too long of a distance between the times that you're asking the questions and when you're asking the question, you're not asking the right questions.

Q. Okay. Do you recall the Bonner study that we discussed earlier?
A. Yes.
Q. Can you pull out, I believe it's 30-8, please.
A. Yes, here it is.
Q. Can you please turn to page 5?
MR. LASKER: I've got it. Page 5 makes no sense because there's 500.
MS. FORGIE: I stopped mid sentence to see if you have. It's page 546.
MR. LASKER: I have it.
BY MS. FORGIE:
Q. Page 546. Can you look at in the first column the second full paragraph starting out with "We used."
A. Right.
Q. Can you read that, please, into the record?
A. "We used PROC MIANALYZE (SAS 9.3) to confirm multiple imputation approach. For the pesticides dieldrin, 2,4, 5-TP, parathion, chlordane, DDT, heptachlor and toxaphene, there was no variability between the five imputed sets because the

registration had been canceled before the phase 2 interviews were conducted."
Q. Do you attach any significance to that paragraph or that sentence?
A. Yes, that is exactly the kind of sentence that states in writing by the AHS investigators what I tried to explain here to counsel when I said it makes a very big difference in the imputation results whether you have time varying versus non-time varying exposures and that it's especially easy to get good, reliable imputations when exposure has pretty much stopped, and that is especially hard when exposure continues. It not only continues but changes heavily.
Q. Anything else?
A. That's it.
Q. Okay. You were also asked several questions about whether or not non-differential exposure misclassification and also about bias away from the null. Do you remember those questions?
A. Yes.
Q. You were asked if those opinions were in your report. Do you remember that?

A. Yes.
Q. Okay. Let me attach -- do you know what's next?
(Discussion off the record.)
MS. FORGIE: I'm going to mark your original report as 30-20.
MR. LASKER: Objection to the extent that we weren't supposed to talk about her original report. That was your objection, but that's fine.
MS. FORGIE: Right. I think I can tie it in.
MR. LASKER: Okay. Things have been changing all over the place here.
(Exhibit Number 30-20 was marked for identification.)
MS. FORGIE: I lost my train of thought.
THE WITNESS: Non-differential.
BY MS. FORGIE:
Q. Right. Is that in your original report which is Exhibit 30-20?
A. Yes.
MR. LASKER: Objection to form. Beyond the scope.

BY MS. FORGIE:
Q. What page is that on?
A. I talk about information bias and mismeasurement of exposure on page 8.
Q. So those opinions are included in your report; correct?
A. Correct.
MR. LASKER: Objection to form.
BY MS. FORGIE:
Q. Do agree that AHS participants would be less likely to use protective equipment when applying glyphosate compared to when they apply other pesticides that are perceived as acutely dangerous?
MR. LASKER: Objection to form. Calls for speculation.
THE WITNESS: As somebody who has done pesticide studies and knows how people act and report, I would think that, yes, they would report their behavior differently, and they would also use different protective equipment depending on how dangerous they consider the task that they're doing is.
///

BY MS. FORGIE:
Q. Can you explain what you mean by -- what is the difference in pesticides in terms of acute danger?
A. Right. So there are herbicides, and there are pesticides that are called insecticides, and there's specifically a class of insecticides that are called organophosphates that are derived from serine gas which is a neurotoxin as we know. And these kind of pesticides generate acute effects so that the farmers would actually who are susceptible to these kind of OP pesticides and use them and get exposed and we know because they are because chlorpyrifos is one of them and we measure that in the urine. That's in one of the papers. They actually have acute sensations that are very unpleasant, and they would definitely want to avoid those. They're flu-like systems. They're developing over a few days.
Q. Can they also get rashes?
A. They could get rashes. There are lots of acute effects. If you have had them

once or twice, you learned your lesson.
Q. How does that affect whether or not you're going to use protective equipment?
A. I would think that a farmer who has these acute sensations would actually make sure that he doesn't spill those pesticides and wears chemically-resistant clothes, gloves, and follows the instructions on the labels for the pesticides and his education on how to handle pesticides much more closely than if you have no acute effect at all from handling pesticides.
Q. Okay. So in the AHS study, did they distinguish between whether or not you were using protective gear for a specific pesticide, or was it more general?
A. It was completely general. It's one question that refers to a -- when you handle pesticides, what do you do, how do you apply them and what kind of protective equipment do you use.
Q. How would that affect, for example, intensity weighting in the AHS study?
A. Well, they're using these two questions, the type of application and the

protective equipment used to generate a generic algorithm, and it's a generic algorithm in which the number of days, frequency of use per year, and the duration of use gets down weighted if you say that you're wearing -- that you're using protective equipment or that you're applying in a certain way that we know like using a closed cab of a tractor that we know reduces exposure. So somebody that would have used glyphosate for ten years and reports using a enclosed cab or a chemically-resistant glove would then get a .2 weight, let's say, for example, and from 10 your numbers would be reduced to 2. That would happen for every pesticide in the same way whether or not you use the resistant gloves only for the OPs or also for glyphosate. And we know that all of these farmers applied multiple pesticides, and we have no idea for which pesticide they reported protective equipment used or for which pesticide they reported what application method.
Q. Okay. You were also asked a question about what weight you would give

the AHS study, the 2018 AHS publication with regard to your opinions in this case. Do you remember that question?
A. Yes.
Q. Can you clarify or expand upon what weight exactly you would give the 2018 AHS study?
MR. LASKER: Objection to form.
THE WITNESS: It definitely has to be reviewed, and it definitely needs to be considered. However, as I tried to explain, there is some weight to every study. Some studies have a larger weight than others. The way I determine that is by looking at the potential biases that these studies may have as well as the size of the study and sensitivity analyses that do help me or don't help me to determine whether these biases have been taken care of, and overall, I feel these sensitivity analyses done in this 2018 publication -- let's call it 2018 -- all make a lot of assumptions under which that I wouldn't agree with. Each of the

sensitivity analyses makes another assumption that would only give you a piece of the puzzle. It never considers the whole realm of biases that you have to actually consider.

BY MS. FORGIE:

Q. And does that fit in any way into the way you look at -- and I never say this right but heterogeneity?

MR. LASKER: Object to form.

THE WITNESS: So what we usually do, we try to do is learn from differences in estimates between studies, and the way we do that is by exploring studies by design and by method in terms of what they're telling us about what the possible biases and what the possible flaws and the possible strengths of each of these study types are, and that's what I've been doing.

BY MS. FORGIE:

Q. Is there anything in the 2018 AHS publication that changes any of your opinions in your original expert report?

A. No.

Q. Is there anything in the 2018 AHS publication that changes any of your opinions as expressed in your rebuttal report?

A. No.

Q. Is there anything in the 2018 AHS publication that changes any of your opinions as expressed in your deposition?

A. No.

Q. You were asked several questions about relative risks in the 2018 AHS study. Do you remember those questions?

A. Yes.

Q. Are there any relative risks -- and you can turn to the study which is -- I can't remember the number, but we'll find out.

MR. LASKER: 30-11.

THE WITNESS: Yeah.

BY MS. FORGIE:

Q. Okay. In 30-11 in the actual publication, are there any relative risks in there that are actually above 1?

A. Yes, there are plenty.

Q. Can you point just a few of those

out, please.

MR. LASKER: Objection to form.

Are you limiting this to the NHL or are we talking about all the other cancers as well?

MS. FORGIE: We're talking about NHL.

MR. LASKER: NHL or subtypes. Okay.

MS. FORGIE: It's the same.

THE WITNESS: So it's actually interesting that most of the relative risks above 1 start to appear when you're doing a 20-year lag. So you have the 1.17, 1.15. You even have a 2.97 for non-Hodgkin's lymphoma T cells.

MR. LASKER: Objection to form.

BY MS. FORGIE:

Q. Why do you think it's interesting that those relative risks above 1 appear in the 20-year lag period?

MR. LASKER: Objection to form. Beyond the scope.

THE WITNESS: Because that lag period excludes the major period of

change of glyphosate, and that's where all of or a lot of the exposure assessment misclassification happened. So once we get rid of that period but we make another big assumption, meaning that any of those exposures are irrelevant for NHL which I don't want to make, but once we do that, we see that the exposures prior to 1995 seem to at least suggest that there are quite a few risk ratios above 1.

MR. LASKER: Objection to form.

BY MS. FORGIE:

Q. Just to clarify, you're looking at the 2018 AHS publication Table 3; is that correct?

A. Yes, correct.

Q. Okay. And what is the relative risk, for example, for diffuse large B cell lymphoma in the 20-year lag period?

MR. LASKER: Objection to form.

THE WITNESS: It's 1.35 for the 20-year lag and the highest exposure level, and it's 1.24 in that medium.

MR. LASKER: For purposes of

completion, the quote, quartile 1, it's 0.89, and for quartile 3, it's 0.9 in the same chart.

THE WITNESS: Correct, because it's classification.

MS. FORGIE: Wait, wait, I'm asking the questions, not Eric, despite his attempt to jump in.

BY MS. FORGIE:

Q. Did the 2018 AHS publication use the same method in terms of comparing high doses to low doses as the 2005 DeRoos publication?

A. No, it doesn't.

Q. And for purposes of clarification, is the 2005 DeRoos study also an AHS --

A. Yes.

Q. -- publication. Okay.

What is the difference in the method?

MR. LASKER: Objection to form. Beyond the scope, outside of her opinions in her supplemental expert report.

THE WITNESS: So what DeRoos did is

she used tertiles of exposure but only among the exposed. So if she's comparing low to high exposure, assuming that these people are more exchangeable or more similar with respect to all risk factors to NHL, then farmers who use absolutely no glyphosate compared to those who either use less or a lot of glyphosate.

BY MS. FORGIE:

Q. And why is that important?

A. It is very important because it points out residual confounding.

Q. What is residual confounding?

A. Residual confounding can bias estimates in any direction, and if residual confounding for the non-exposed to glyphosate means there are risk factors that we haven't taken care of, we would have an increased risk among the non-exposed which would then give us protective effects for glyphosate that we haven't taken care of.

Q. And do you think that glyphosate has a protective effect with regard to NHL?

A. I would not make that assumption at

all.

Q. You were asked several questions about biomonitoring studies and sensitivity analysis that were recommended for the AHS study. Do you remember those questions?

A. Yes.

Q. Did any of those sensitivity analysis publications or bio -- let's start one at a time. Did any of the sensitivity analysis publications solve any of the substantial problems that you've addressed with regard to the 2018 publication?

A. No, because they only address a partial picture at a time. They never address the whole picture.

Q. Did any of the biomonitoring studies or publications that you were asked about solve any of the problems which you discussed with regard to the AHS publication?

A. No, they don't. And that's because biomonitoring studies are really short-term studies. They do not tell you what happens over a 30-year period. When we talk about cancer, we really have to consider chronic

exposures over a long period of time.

And biomonitoring gives you something very acute and within the period that you're doing the biomonitoring, and you're only doing it in a hundred people or less because it's expensive. And then you're assuming that they're representative of the whole cohort in terms of what you're learning from them.

Q. And you were asked several questions about whether or not there were publications that support your statements in your supplemental report. Do you remember those questions?

A. Yes.

MR. LASKER: Objection to form.

BY MS. FORGIE:

Q. And are there such publications that support your opinions?

A. Yes, there are.

Q. And can you just tell me a couple of those, please?

A. Yeah, the Gray paper. It's the Blair 2002 paper. It's the Ward editorial for the AHS 2018, and it's the Acquavella

paper from -- I don't know when it was.
MR. LASKER: 1997?
THE WITNESS: Yeah.
MR. ESFANDIARY: 2016.
MR. LASKER: No, 1997 and she said, yeah. Please don't testify for the witness.
(Simultaneous cross-talk interrupted by the reporter.)
MS. FORGIE: I don't think we have it.
BY MS. FORGIE:
Q. Let's go to the Gray paper. What exhibit number is that, please?
A. This is Exhibit Number 30-18.
Q. Can you tell me what in 30-18 in the Gray paper supports your statements in your supplemental report, please?
MR. LASKER: Objection to form. The witness has already prepared a supplemental report and she cited parts of authority Gray 2000. This is not proper redirect.
BY MS. FORGIE:
Q. You can answer.

A. I before was shown all of the -- all of the notes that these authors made in terms of what would improve the study and told that this would be really solving the problems. Well, they are pointing out under study design perspective cohort studies --
Q. Can you tell us what page you're on?
A. Yeah, it's page 64. Exactly the two points or the two of the four points I'm making. One is at the end of the first paragraph where it says --
MR. LASKER: I'm sorry. Where are you? The top of the page?
THE WITNESS: 64 end of the first paragraph.
MR. LASKER: Paragraph starting "Determining exposure status prior to"?
THE WITNESS: Yes. So the last sentence here states, "It is critical that follow-up surveys of the cohort be administered on a regular basis to document how exposure and disease states change as subjects age."
///

BY MS. FORGIE:
Q. And how does that fit into your supplemental report, or how does it support your supplemental report?
MR. LASKER: Objection to form.
MS. FORGIE: Let me rephrase it so it's not compound.
BY MS. FORGIE:
Q. How does that statement from the Gray article support your supplemental report?
MR. LASKER: Objection to form.
THE WITNESS: Well, it helps my argument that I've been making that you really need to in situations where exposures are time changing, you need follow-up surveys to assess exposures that are changing. You cannot just go with a baseline assessment of exposure ignoring all the changes in exposure, and they're also saying you need follow-up surveys that should be administered on a regular basis. Five years is a very long period between interviews, and it's not just five years

because the interviewing took them three, four, or five years for 56,000. It's actually up to nine or ten years between surveys.
BY MS. FORGIE:
Q. Is there anything else in the Gray article that supports your opinions as expressed in your supplemental report?
A. Yeah, they're also under the same -- the second paragraph, the last sentence it says, "Overall, though, we are very enthusiastic with the decision of the AHS team to investigate in the perspective court" --
Q. Investigator --
MR. LASKER: Why don't you start that over again.
THE WITNESS: "Overall, though, we are very enthusiastic about the decision of the AHS team to invest in the perspective court design and encourage the investigators to make every feasible effort to achieve acceptable response rates in the follow-up surveys of the cohort and address potential biases in

the study."
So acceptable response rates are very important, and a 63 percent response rate when you have to update exposures that are changing I don't think are acceptable.
BY MS. FORGIE:
Q. Okay. Anything else in the Gray study?
A. That's it.
Q. Okay. And turning now to the Blair publication which I believe is in there.
A. Yes.
Q. Let's find the number first.
A. 30-19.
Q. Let's wait until they find it.
MR. LASKER: Okay.
BY MS. FORGIE:
Q. What in that Blair 2002 article supports your opinions as expressed in your supplemental report, please.
MR. LASKER: Objection to form.
BY MS. FORGIE:
Q. You can answer.
A. Page 98, the second column, first

paragraph, so it's pretty much the second to last --
MR. LASKER: I'm sorry. Where are you? Second column?
THE WITNESS: Second column. There are two columns. The right column. In the middle of that first paragraph column it states, "If the true relative risk was two," do you have that.
MR. LASKER: Yeah, I'm with you.
THE WITNESS: "Calculated relative risks for individual pesticides would be from 1.1 to 1.6. Even though the level of agreement is quite high, the impact of misclassification in this range on the relative risk can be substantial and diminish the opportunity to detect real associations."
BY MS. FORGIE:
Q. And how does that statement from the Blair article support the opinions that you expressed in your supplemental report?
MR. LASKER: Objection to form.
///

BY MS. FORGIE:
Q. You can answer.
A. It explains exactly the argument I've been making about non-differential misclassification doing what I said it would.
Q. With regard to -- do we have another sticky, please.
MR. LASKER: I gave them all to you.
MS. FORGIE: Thank you. I'm going to mark as 21 the Acquavella article.
(Exhibit Number 30-21 was marked for identification.)
MS. FORGIE: Or is that already in there, the 2006 Acquavella.
THE WITNESS: I don't think so.
MS. FORGIE: I only have one copy. We'll do the other one first. Let's do 30-22.
(Exhibit Number 30-22 was marked for identification.)
BY MS. FORGIE:
Q. Can you tell me what I've just marked as Exhibit 30-22, the Ward editorial.

Can you tell me what that is, please.
MR. LASKER: Objection to form. Beyond the scope. This document was not even discussed during the direct deposition.
BY MS. FORGIE:
Q. You can answer.
A. It's an editorial written by Elizabeth Ward, who is a very well-known pesticide and cancer researcher on the glyphosate use and cancer incidence in the AHS study in epidemiologic perspective. So it's an editorial on the actual NCI 2018 study.
Q. Do you know if it was published in the same journal at the same time as the 2018 AHS publication?
A. That's what it looks like.
Q. Okay. And can you tell me what in this Ward editorial supports your opinions as expressed in your supplemental expert report, please.
A. Yes. On page 2, the first long paragraph on the left, the last sentence.
Q. Can you read that?

MR. LASKER: Hold on a second. Where are you?
THE WITNESS: Page 2. First paragraph. The end, the last sentence.
MR. LASKER: "Thus although"?
THE WITNESS: "Thus although."
MR. LASKER: Thank you.
THE WITNESS: "Thus although pesticide applicators likely provide the best opportunity for investigating the risk associated with glyphosate exposure, the intermittent nature and range of exposure may limit the ability of studies in this population to detect cancer hazards."
BY MS. FORGIE:
Q. Can you explain how that statement supports the opinions that you gave as expressed in your supplemental report, please?
MR. LASKER: Object to form.
THE WITNESS: What it points to is the possibility of exposure misclassification due to the intermittent nature and the range of

exposures and, therefore, the opportunities to generate nondifferential misclassification of exposure especially over a very long period of time and especially in environment where exposures change.
MS. FORGIE: Give us one minute while we get that extra copy and then we're almost done.
MR. LASKER: Don't forget my 3 minutes and 30 seconds.
MS. FORGIE: I'm sure if I did forget it, you would remind me.
MR. LASKER: So what is this, 30-20?
MS. FORGIE: Didn't we mark it the Acquavella?
THE WITNESS: 21.
BY MS. FORGIE:
Q. 30-21. And is there anything in what we've marked now as 30-21, the Acquavella study from 2006, that supports your opinions as expressed in your supplemental expert report?
MR. LASKER: Objection to scope,

objection to form and beyond the scope of direct examination in this case.
THE WITNESS: Yes. The title of the whole paper is exposure misclassification in studies of agricultural pesticides insights from biomonitoring. The conclusion of this abstract of the study states "Our results demonstrates the importance of collecting type of pesticide formulation and suggests a generic exposure assessment is likely to result in appreciable exposure misclassification for many pesticides." When you look at what he means by generic, he points out "Dosemeci, et al., recently proposed a generic algorithm for using questionnaire information to develop an average lifetime exposure intensity score for specific pesticides. This score could then be used as a multiplier of days of use to produce an intensity-weighted estimate of cumulative exposure."
MR. LASKER: I'll also object to

form -- object to the entire line of questioning about this article because it is not listed in the reference list of the articles that Dr. Ritz relied upon in connection with her supplemental report, and the fact that it has been shown to her during the break after direct questioning does not make it something that she's relied upon for her supplemental report. She clearly did not. It's not in her materials, and, therefore, this whole line of questioning is improper.
MS. FORGIE: I don't agree with any of those statements.
BY MS. FORGIE:
Q. Going back to just that one statement in the conclusion section, the one where it says it is likely to result in appreciable exposure misclassification for many pesticides.
Do you see that?
A. Yes.
Q. Can you tell me how that supports your opinions as expressed in your

supplemental report?
MR. LASKER: Objection to form.
THE WITNESS: Because the algorithm they developed is really a generic algorithm, meaning that they are using duration and frequency and weighing it according to the exact same weights for every pesticide. So if somebody reports a protective equipment used, then that protective equipment is presumed to be used for every single pesticide; so every single pesticide will be weighted accordingly whether or not that protective equipment was actually used for one and not the other pesticide is not known and is not taken into consideration. Neither are the formulations of pesticides.
MR. LASKER: Further objection to this line of questioning because there would be no opportunity for defense counsel to be prepared to question Dr. Ritz on a paper that she did not include in her reference list for her supplemental expert report, did not

mention in her supplemental expert report and the fact that this is new opinions being offered in redirect or cross-examination based upon a document the expert had not previously disclosed.
BY MS. FORGIE:
Q. Do you agree with Dr. Acquavella that the way the data was collected in the AHS publication suggests that it is likely to result in appreciable exposure misclassification for many pesticides?
MR. LASKER: Objection to form.
THE WITNESS: I agree partially. I agree for the pesticides that had a lot of time varying components to them.
BY MS. FORGIE:
Q. And did glyphosate have a lot of time varying components to it?
A. Yes.
Q. So with regard to glyphosate, you would agree with Dr. Acquavella that the method of collection in the AHS study was likely to result in appreciable exposure misclassification; is that correct?
A. Correct.

MR. LASKER: Objection to form.
BY MS. FORGIE:
Q. Do you know who Dr. Acquavella is?
A. Yes.
Q. Who is he?
A. Dr. Acquavella was, for some time, employed by Monsanto as their epidemiologist and he came to several of the AHS study meetings, one of them to actually talk about biomonitoring to the panel.
MS. FORGIE: Okay. I don't have any questions.
MR. LASKER: You mean any further questions?
MS. FORGIE: Any further questions.
MR. LASKER: Let's take a quick break so we can get ourselves organized but nobody leave the room. This will not be 40 minutes.
THE VIDEOGRAPHER: We're off the record at 6:05 p.m.
(Recess taken from 6:05 p.m. to 6:06 p.m.)
THE VIDEOGRAPHER: We are back on the record at 6:06 p.m.

FURTHER EXAMINATION
BY MR. LASKER:
Q. Dr. Ritz, in your answers to the questions from defense counsel, if I understand correctly, you criticized the 2018 NCI study because it did not compare exposures -- it compared exposures to non-exposed as opposed to exposures within the different exposure groups; is that correct?
MS. FORGIE: Object to form.
THE WITNESS: I pointed out one sort of potential bias that could have biased away from the null.
BY MR. LASKER:
Q. Because of that?
A. Because of that.
Q. Your initial expert report on page 30 -- on page 23, here you're talking about the DeRoos 2005 paper; correct?
A. Yes.
Q. And in that -- in your initial expert report, you state that authors decide to compare the cancer risk in these exposed groups, not, underlined, to that among the

never exposed but instead compared high exposure to low exposure while this type of comparison attempts to control for and eliminate other risk factors that may distinguish non-exposed from exposed, hence reduce potential confounding bias. This type of approach also reduces any remaining exposure contrast even further and thus reduces the ability to estimate risk increases with exposure and make the effect estimates also less comparable to those from other studies; correct?

A. Yes --

MS. FORGIE: Object to form.

THE WITNESS: I'm completely standing behind this because I'm already pointing out the potential confounding bias.

BY MR. LASKER:

Q. So in your initial expert report with the 2005 paper, you made a criticism because they didn't compare exposure groups to non-exposed, didn't you?

MS. FORGIE: Object to form.

THE WITNESS: No, I'm not making a

criticism. I'm pointing out that this is a very useful method to reduce potential confounding, however, you buy the reduction in bias with a reduced ability to find a true effect.

BY MR. LASKER:

Q. Exhibit 30-22, the Ward editorial, next document they had you look at.

A. Yes.

Q. In the first page of the editorial, the second column, the first full paragraph which you did not read from Dr. Ward states "Although the Andreotti, et al study?

A. Where's that?

Q. Right-hand column, first full paragraph?

A. Yes, okay.

Q. "Dr. Ward states that although the Andreotti, et al, study, the 2018 study adds substantially to the body of epidemiologic evidence regarding the potential association between glyphosate exposure and cancer in humans, interpreting the new findings in the context of previous studies may be

difficult"; correct?

A. That's what it says.

Q. Do you agree the 2018 NCI study adds substantially to the body of epidemiologic evidence regarding the potential association between glyphosate exposure and cancer in humans?

A. I don't know what she means by "substantially," but it helped me understand what the problems with the study were, yes.

Q. And my last question with respect to the testimony that you gave regarding protective equipment is that your understanding that glyphosate has low acute toxicity?

MS. FORGIE: Object to form.

THE WITNESS: My understanding is that OP pesticides are much more easily irritative and having effects on a farmer that would make him want to wear protective equipment than glyphosate would.

BY MR. LASKER:

Q. My question, though, is it your understanding that glyphosate has low acute

toxicity?

MS. FORGIE: Object to form. Asked and answered.

You can answer it again.

THE WITNESS: My understanding of pesticide acute effects is that OP pesticides have effects that will make farmers use protection probably at a much higher level than glyphosate would.

BY MR. LASKER:

Q. I didn't ask about OP pesticides. I've asked a simple question. Is it your understanding that glyphosate has low acute toxicity?

MS. FORGIE: Objection. Asked and answered twice.

You can answer it again.

Where are we on time?

THE WITNESS: I was not talking about an absolute toxicity. I was talking about a relative toxicity, and relativeness has to be with respect to other pesticides because these farmers were applying multiple pesticides, and, therefore -- and they were only asked to

respond with regard to protective equipment in one question that does not specify the pesticide. So the farmer when they are asked this question has to actually compare the toxicities in his head or he had to compare them before and then report what he's been using for the most -- for the one with the most side effects.

BY MR. LASKER:

Q. Dr. Ritz, is it your understanding that glyphosate has low acute toxicity?

MS. FORGIE: Objection. Asked and answered three times. You can answer it a fourth time.

THE WITNESS: This is not a question that I wanted to point out as an acute -- as an absolute. It is something that the farmer was asked to compare. It's a relative comparison of acute toxicities. And in terms of -- everybody rates risks, and if I'm a bungee jumper, my risk rating is probably different from somebody who is a grandmother. So we are all rating our

risks in engaging with certain activities in a different way.

So a farmer who would be co-exposed to glyphosate and organophosphates when asked what kind of protective equipment they are using would probably go with the one that he knows he has the most side effects from and report on that one.

BY MR. LASKER:

Q. Dr. Ritz, is it your understanding that glyphosate has low acute toxicity?

MS. FORGIE: Objection. Asked and answered four times.

You can answer it again.

Where are we on time?

THE VIDEOGRAPHER: It's been five minutes since you started.

MS. FORGIE: Okay. That's it. She's not going to answer it.

MR. LASKER: She clearly is not going to answer it, but I started asking the question a couple minutes ago and still haven't got an answer.

MS. FORGIE: It's over. It's been

five minutes.

MR. LASKER: Are you instructing the witness not to answer the question?

MS. FORGIE: I'm saying you've had three-and-a-half minutes. You've gone five minutes. The time is up. I don't need to instruct her not to answer because the time is up.

BY MR. LASKER:

Q. Dr. Ritz, does glyphosate have low acute toxicity?

MS. FORGIE: We're done. The time is up. She's already answered it four times anyway.

I want to put one statement on the record. Counsel stated that Dr. Ritz and by implication myself had not discussed the Acquavella 2006 article. In fact, it is number one on the supplemental materials list that was provided to counsel.

MR. LASKER: If I misstated it, I will correct myself.

MS. FORGIE: We all make mistakes, but it's right there.

MR. LASKER: It's Andreotti. Oh, the supplemental materials list related -- I'm not sure what this is. I will accept the representation. I was looking at expert report, the supplemental expert report which has a material -- has a reference list that does not mention Acquavella.

MS. FORGIE: Right, but this is Muchy and Ryder which she couldn't have had when she did her report.

MR. LASKER: I will rephrase my objection accordingly. I object to the questioning regarding a study and reliance upon a study, the Acquavella 2006 study that Dr. Ritz never mentions in her supplemental report and is not on the reference list for her supplemental expert report.

MS. FORGIE: I don't agree with any of that but we're done.

(Testimony continues on the following page in order to include jurat.)

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THE VIDEOGRAPHER: This concludes today's proceedings in the deposition of Dr. Beate Ritz. We're off the record at 6:14 p.m.

(Time noted: 6:14 p.m.)

____

Beate Ritz, M.D., Ph.D.

Subscribed and sworn to before me this day of , 2018.

____

(Notary Public)

My Commission expires: ____________

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C E R T I F I C A T E

STATE OF CALIFORNIA:

I, LISA MOSKOWITZ, CSR, RPR, CRR, CLR, NCRA Realtime Systems Administrator, Certified Shorthand Reporter, do hereby certify:

That the witness whose deposition is hereinbefore set forth was duly sworn, and that such deposition is a true record of the testimony given by such witness.

I further certify that I am not related to any of the parties to this action by blood or marriage, and that I am in no way interested in the outcome of this matter.

IN WITNESS WHEREOF, I have hereunto set my hand this 20th day of January, 2018.

____

LISA MOSKOWITZ, CSR 10816, RPR, CRR, CLR
NCRA Realtime Systems Administrator

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NAME OF CASE:
DATE OF DEPOSITION:
DEPONENT:

1. To clarify the record.
2. To conform to the facts.
3. To correct transcription error.

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