

Exhibit 4

1 UNITED STATES DISTRICT COURT
2 NORTHERN DISTRICT OF CALIFORNIA

3
4 IN RE: ROUNDUP PRODUCTS)
LIABILITY LITIGATION,)
5)
_____) MDL No. 2741
6)
This document relates to:) Case No.
7) 16-md-02741-VC
ALL ACTIONS)
8)
_____)

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15 VIDEO DEPOSITION OF
16 BEATE RITZ, MD, PHD
17 Los Angeles, California
18 Friday, January 19, 2018
19
20
21

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

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1 LOS ANGELES, FRIDAY, JANUARY 19, 2018
 2 1:06 P.M.
 3
 4 THE VIDEOGRAPHER: Good afternoon.
 5 This is the start of tape labeled
 6 number 1 of the videotaped deposition of
 7 Dr. Beate Ritz in the matter of Roundup
 8 Products Liability Litigation. This
 9 case is before the United States
 10 District Court for the Northern District
 11 of California, case number bearing MDL
 12 number 2741 and case number 16-MD-02741-VC.
 13 This deposition is being held at
 14 12100 Wilshire Boulevard, Los Angeles,
 15 California. Today's date is January 19,
 16 2018. The time is approximately
 17 1:06 p.m.
 18 My name is Scott McNair from TSG
 19 Reporting, Incorporated. I'm the legal
 20 video specialist. The court reporter
 21 today is Lisa Moskowitz also in
 22 association with TSG Reporting.
 23 Will counsel please identify
 24 yourselves for the record.
 25 MR. LASKER: Erick Lasker from

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1 Hollingsworth, LLP, on behalf of
 2 Monsanto.
 3 MS. SHIMADA: Elyse Shimada from
 4 Hollingsworth, LLP, on behalf of
 5 Monsanto.
 6 MR. ESFANDIARY: Pedram Esfandiary
 7 of Baum Hedlund, plaintiffs.
 8 MS. FORGIE: Kathryn Forgie on
 9 behalf of the plaintiffs.
 10 MR. BAUM: Michael Baum on behalf
 11 of plaintiffs.
 12 THE VIDEOGRAPHER: And on the
 13 phone?
 14 MR. WOOL: David Wool from Andrus
 15 Wagstaff on behalf of plaintiffs.
 16 THE VIDEOGRAPHER: Thank you.
 17 MS. FORGIE: Anyone else on the
 18 phone?
 19 THE VIDEOGRAPHER: Will the court
 20 reporter please swear in the witness.
 21
 22 Beate Ritz, MD, PhD,
 23 called as a witness, having been
 24 duly sworn, was examined and
 25 testified as follows:

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1 MS. FORGIE: I have a statement for
 2 the record. This deposition is being
 3 taken pursuant to pretrial order number
 4 34, and it is limited to the December,
 5 2017 -- not December, 2017. The 2017
 6 AHS study and limited for two-and-a-half
 7 hours.
 8 MR. LASKER: Just for
 9 clarification, the study will be
 10 published in 2018. So I may refer to it
 11 as the 2018 study. Beyond that, why
 12 don't we get started.
 13
 14 EXAMINATION
 15 BY MR. LASKER:
 16 Q. Dr. Ritz, let me hand to you what's
 17 been marked as Deposition Exhibit 30-1.
 18 (Exhibit Number 30-1 was marked
 19 for identification.)
 20 BY MR. LASKER:
 21 Q. Dr. Ritz, if you could just
 22 identify for the record this is the
 23 supplemental expert report that you have
 24 submitted in this litigation; correct?
 25 A. Yes.

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1 Q. I'd like to start off if you could
 2 turn to page 8 of your report. Toward the
 3 top you state "Thus overall and in summary,
 4 there is non-differential exposure
 5 misclassification from several sources that
 6 impact the AHS finding," and then you set
 7 forth four different sources; correct?
 8 A. Yes.
 9 Q. Okay. I'd like to walk through
 10 those with you today. I'm going to start at
 11 the bottom with your comment with respect to
 12 the imputation methodology that was used in
 13 the study. Okay?
 14 A. Uh-huh.
 15 Q. And you would agree that the
 16 investigators for the AHS cohort had used
 17 the same imputation method that is used in
 18 the 2018 JNCI study and numerous other
 19 peer-reviewed and published epidemiological
 20 studies of the AHS cohort; correct?
 21 MS. FORGIE: Object to the form.
 22 THE WITNESS: The AHS investigators
 23 have used this imputation to impute
 24 50-some pesticides, and they have
 25 published mostly on those pesticides.

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1 Those pesticides that are not glyphosate
 2 have a very different misclassification
 3 structure from glyphosate.
 4 BY MR. LASKER:
 5 Q. I understand that. I just want
 6 to --
 7 A. So the imputations work differently
 8 when you have a baseline misclassification
 9 that you're starting with.
 10 Q. I understand that's your opinion.
 11 Just to be clear, there have been numerous
 12 publications, epidemiological publications
 13 out of the AHS cohort that have used this
 14 same imputation methodology; correct?
 15 MS. FORGIE: Objection. Asked and
 16 answered. That's the same question you
 17 just asked.
 18 You can answer it again.
 19 THE WITNESS: It doesn't matter how
 20 many publications there are. Unless
 21 they are related to glyphosate they have
 22 a very different exposure
 23 misclassification structure.
 24 BY MR. LASKER:
 25 Q. Okay. Let me just walk through

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

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

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1 you would agree the "American Journal of
 2 Epidemiology" is a reputable journal;
 3 correct?
 4 A. Well, it's a journal of
 5 epidemiology that we use and we publish in,
 6 yes.
 7 Q. And, in fact, you've peer-reviewed
 8 for this journal; correct?
 9 A. Yes.
 10 Q. It's a reputable journal; correct.
 11 A. It has a reputation, yes.
 12 Q. And in this 2013 publication and
 13 the title is "Risk of Total Aggressive
 14 Prostate Cancer and Pesticide Use in the
 15 Agricultural Health Study," the
 16 investigators use the same AHS imputation
 17 method to look for associations between
 18 prostate cancer and 48 different pesticides;
 19 correct?
 20 MS. FORGIE: Object to the form.
 21 THE WITNESS: I don't know. I
 22 haven't counted them.
 23 BY MR. LASKER:
 24 Q. Well, it states in the -- it states
 25 on the -- at page 64 -- first of all, on

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1 page 64 it notes that the investigators used
 2 the same imputation -- AHS imputation
 3 methodology that's used in the 2018 JNCI
 4 study; correct?
 5 MS. FORGIE: Object to the form.
 6 THE WITNESS: I don't see that.
 7 Where is that?
 8 BY MR. LASKER:
 9 Q. For participants, if you're looking
 10 at page 64.
 11 A. Yes.
 12 Q. In the left-hand column --
 13 A. Oh, the Heltshe, yes.
 14 Q. Yes.
 15 A. Mm-hmm.
 16 Q. So they use the same imputation
 17 methodology in this study; correct?
 18 MS. FORGIE: Object to the form.
 19 THE WITNESS: Well, they use it for
 20 different pesticides.
 21 BY MR. LASKER:
 22 Q. Right. With respect to the number
 23 of pesticides on page 59 in the abstract,
 24 they note that they use this imputation
 25 methodology to evaluate 48 pesticides, and

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1 that's in the abstract, the fourth line and
 2 fifth line down; correct?
 3 MS. FORGIE: Object to the form.
 4 BY MR. LASKER:
 5 Q. In the abstract.
 6 A. In the abstract it says "using
 7 Poisson regression to evaluate lifetime use
 8 of 48 pesticides and prostate cancer," yes.
 9 Q. Right. Thank you.
 10 Let's move on. This is a 2015
 11 study. We've marked it as Exhibit 30-4.
 12 (Exhibit Number 30-4 was marked
 13 for identification.)
 14 THE WITNESS: By the way, there's
 15 no glyphosate in there.
 16 BY MR. LASKER:
 17 Q. That's fine. 30-4 is a publication
 18 by -- with a lead author of Dr. Silver.
 19 This is published in the "International
 20 Journal of Cancer"; correct?
 21 A. Yes.
 22 Q. It's a journal that you've
 23 peer-reviewed for; correct?
 24 A. No.
 25 Q. Oh, you never peer-reviewed for

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1 this journal? Maybe I misread that on your
 2 C.V.
 3 A. No.
 4 MS. FORGIE: Wait. Let's wait for
 5 the question.
 6 THE WITNESS: I can't remember ever
 7 peer reviewing this journal.
 8 BY MR. LASKER:
 9 Q. It is a reputable cancer journal,
 10 though; correct?
 11 A. I have no idea.
 12 Q. Okay. In this article "Cancer
 13 Incidence and Metolachlor Use in the
 14 Agricultural Health Study, an Update," if
 15 you look at page 2631 right above
 16 "Statistical analysis," the investigators in
 17 this publication with the AHS cohort also
 18 used the same imputation methodology used in
 19 the 2018 JNCI study; correct?
 20 MS. FORGIE: Object to the form.
 21 Also take as much time as you want to
 22 read.
 23 THE WITNESS: I have to see what
 24 the --
 25 ///

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1 BY MR. LASKER:
 2 Q. Note 15.
 3 A. Yes.
 4 Q. So they use the same imputation
 5 method in this study; correct?
 6 MS. FORGIE: Object to the form.
 7 THE WITNESS: They use this
 8 imputation for metolachlor, yes.
 9 BY MR. LASKER:
 10 Q. Let's go to the next document in
 11 line.
 12 (Exhibit Number 30-5 was marked
 13 for identification.)
 14 BY MR. LASKER:
 15 Q. This will be Exhibit 30-5.
 16 MS. FORGIE: This is 30-5?
 17 MR. LASKER: 30-5.
 18 BY MR. LASKER:
 19 Q. So this is the 2015 publication
 20 "Incidence of Solid Tumors Among Pesticide
 21 Applicators Exposed to the Organophosphate
 22 Insecticide Diazinon in the Agricultural
 23 Health Study, an updated analysis." If you
 24 look at page 497 --
 25 MS. FORGIE: Again, take your time.

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1 Read as much as you need.
 2 BY MR. LASKER:
 3 Q. Under "enrollment assessment"?
 4 MS. FORGIE: Wait. 497 enrollment
 5 assessment.
 6 MR. LASKER: Yes, on the left-hand
 7 side about two-thirds of the way down on
 8 page 197, you see "enrollment
 9 assessment"?
 10 THE WITNESS: No.
 11 MS. FORGIE: No. I see "exposure
 12 assessment."
 13 MR. LASKER: Exposure assessment.
 14 I'm sorry. I misspoke.
 15 MS. FORGIE: I'm sorry. I wasn't
 16 trying to be difficult. I didn't see
 17 it.
 18 MR. LASKER: No, that's fine.
 19 BY MR. LASKER:
 20 Q. As you can see if you look to
 21 footnote 18 which is also to the Heltshe
 22 paper and you can confirm that, but in this
 23 2015 paper lead author Dr. Jones, they also
 24 use the same AHS imputation methodology used
 25 in the 2018 JNCI study; correct?

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1 MS. FORGIE: Object to the form.
 2 THE WITNESS: Let's see.
 3 BY MR. LASKER:
 4 Q. If you look at the --
 5 MS. FORGIE: Wait, let her read.
 6 THE WITNESS: Oh, multiple
 7 imputation. I got it. Yes. I see it.
 8 BY MR. LASKER:
 9 Q. So they use the same imputation
 10 methodology as the 2018 JNCI study; correct?
 11 MS. FORGIE: Object to the form.
 12 THE WITNESS: They use it for
 13 diazinon.
 14 BY MR. LASKER:
 15 Q. This is an article that was
 16 published after peer review in the "Journal
 17 of Occupation of Environmental Medicine";
 18 correct?
 19 A. Correct.
 20 Q. Let's move to the next one in line.
 21 This is 30-6.
 22 (Exhibit Number 30-6 was marked
 23 for identification.)
 24 MR. ESFANDIARY: Counsel, do you
 25 have extra copies for me as well?

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1 BY MR. LASKER:
 2 Q. This is an article that was
 3 published in the "International Journal of
 4 Epidemiology" in 2016, lead author is
 5 Dr. Koutros; correct?
 6 A. Yes.
 7 Q. And if you could look to
 8 page 794 -- I just can't remember if I said
 9 this. This is "Occupational Exposure to
 10 Pesticides and Bladder Cancer Risk." If you
 11 look on page 794, in the exposure
 12 assessment. And, again, they refer in the
 13 text as well as in the footnote to the
 14 Heltshe paper, this study also used the same
 15 imputation -- AHS imputation methodology as
 16 the 2018 JNCI study; correct?
 17 MS. FORGIE: Object to the form
 18 and, again, take your time to review it.
 19 THE WITNESS: Where was that again.
 20 BY MR. LASKER:
 21 Q. Exposure assessment at the end of
 22 the first paragraph.
 23 A. Oh, Heltshe, et al., yes, I see it.
 24 Q. So, again, this study used the same
 25 imputation methodology as the 2018 JNCI

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

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1 3, the second and third page of this
 2 publication. It sort wraps over -- oh, no,
 3 it's on page 3, bottom of the left-hand
 4 column going to the top of the right-hand
 5 column.
 6 MS. FORGIE: I'm sorry. What page
 7 are we on now?
 8 MR. LASKER: The third page, I'm
 9 sorry. The bottom of the left-hand
 10 column going to the top of the
 11 right-hand column.
 12 BY MR. LASKER:
 13 Q. In Engel publication, they also use
 14 the same AHS imputation methodology that was
 15 used in the 2018 JNCI study; correct?
 16 MS. FORGIE: Object to the form.
 17 THE WITNESS: They say they used
 18 the same imputation, but these are
 19 different individuals.
 20 BY MR. LASKER:
 21 Q. Understood. But they use the same
 22 imputation methodology; correct?
 23 MS. FORGIE: Object to the form.
 24 Take your time.
 25 THE WITNESS: They used Heltshe

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1 2012, yes.
 2 BY MR. LASKER:
 3 Q. Let's go to the next document.
 4 This is the 2017 -- this is Exhibit 30-8.
 5 (Exhibit Number 30-8 was marked
 6 for identification.)
 7 THE WITNESS: Just a second.
 8 MS. FORGIE: Hold on. She's still
 9 reviewing the other one.
 10 BY MR. LASKER:
 11 Q. Exhibit 30-8; correct? And this is
 12 an article lead author Bonner entitled
 13 "Occupational Exposure to Pesticides and the
 14 Incidence of Lung Cancer in the Agricultural
 15 Health Study, published in the Journal of
 16 Environmental Health Prospectus"; correct?
 17 A. Yes.
 18 Q. And if you look to page 545 of this
 19 publication in the middle column towards the
 20 bottom, you can see, again, the reference to
 21 Heltshe, and this publication appeared to be
 22 a publication that also used the same
 23 imputation methodology as was used in the
 24 2018 JNCI study; correct?
 25 MS. FORGIE: Object to the form.

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1 THE WITNESS: They used Heltshe,
 2 yes. Heltshe 2012.
 3 BY MR. LASKER:
 4 Q. And you would agree that
 5 independent peer review is a corner of
 6 science in the United States and
 7 internationally; correct?
 8 A. It is, but it doesn't always work.
 9 Q. And you would agree that the peer
 10 review process provides the intellectual
 11 rigor required to ensure that manuscripts
 12 adhere to what is acceptable in the field
 13 with regard to reviewing the relevant
 14 literature and examining statistics and
 15 determining whether research protocols apply
 16 widely accepted methods, report valid
 17 results, and avoid or account for biases and
 18 draw conclusions appropriate to the study's
 19 findings; correct?
 20 MS. FORGIE: Object to the form.
 21 THE WITNESS: Peer review is
 22 supposed to do that, that it always
 23 reaches that goal is a high order.
 24 BY MR. LASKER:
 25 Q. And you are not aware in the five

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1 years now since the first of these
 2 peer-reviewed epidemiological analyses that
 3 we just walked through were published of any
 4 letter to the editor or published response
 5 to any of these studies that have criticized
 6 those studies for their use of imputation
 7 for the 37 percent of the AHS cohort that
 8 did not respond to phase 2; correct?
 9 MS. FORGIE: Object to the form.
 10 Are you including the AHS study?
 11 MR. LASKER: For this purpose --
 12 MS. FORGIE: It wasn't clear in
 13 your question.
 14 MR. LASKER: The studies we looked
 15 at are not including the 2018 NCI study.
 16 BY MR. LASKER:
 17 Q. For the studies we just marked as
 18 Exhibits 30-2 to 30-8 which were first
 19 published five years ago, are you aware of
 20 any letter to the editor or published
 21 response to any of these epidemiological
 22 studies that have criticized those studies
 23 for their use of imputation method for the
 24 37 percent of the AHS cohort that did not
 25 respond to the phase 2 questionnaire?

1 MS. FORGIE: Object to the form.
 2 THE WITNESS: Since I did not read
 3 all of these papers, I cannot tell you
 4 whether there's a letter because I
 5 haven't looked them up. However, I
 6 wouldn't be surprised if there weren't
 7 because most of these papers did not
 8 include glyphosate.

9 BY MR. LASKER:

10 Q. In your role as the chair of the
 11 AHS outside advisory group, you've not been
 12 made aware of any criticism of any of these
 13 published studies, Exhibits 30-2 through
 14 30-8, for their use of the AHS imputation
 15 method to derive AHS exposure data; correct?

16 MS. FORGIE: Object to the form.

17 THE WITNESS: This advisory group
 18 has not met for ten years.

19 BY MR. LASKER:

20 Q. You have had --

21 A. And these papers are five years
 22 old.

23 Q. Are you aware -- well, let me put
 24 it to you this way: Have you, as the chair
 25 of the AHS advisory group, reached out to

1 the time of the study would have that
 2 criticism. Glyphosate, in my mind, is
 3 the one -- is currently the one that's
 4 most affected.

5 BY MR. LASKER:

6 Q. Is it your opinion that the studies
 7 that have used imputation methodology for
 8 pesticides other than glyphosate are
 9 unreliable?

10 MS. FORGIE: Object to the form.

11 THE WITNESS: Again, these
 12 imputations work based on assumptions we
 13 are making, and these assumptions may be
 14 much more valid or I think they are
 15 quite valid for any of the pesticides
 16 where the use didn't change. For
 17 example, for lindane and DDT that has
 18 been mostly used in the '70s or maybe in
 19 the '80s. DDT was outlawed in '72. So
 20 for those, I have absolutely no problems
 21 because what was reported at baseline is
 22 the use that happened, and it shouldn't
 23 have changed after baseline. So
 24 whatever was imputed from baseline to
 25 the future was probably correct. This

1 any of the investigators, authors of these
 2 publications, to raise questions or concerns
 3 about the use of this imputation methodology
 4 in all of these peer-reviewed publications?

5 MS. FORGIE: Object to the form.
 6 Asked and answered.

7 You can answer it again.

8 THE WITNESS: Well, the most
 9 problem I have with the method is in
 10 terms of glyphosate, and most of these
 11 papers do not refer to glyphosate.

12 BY MR. LASKER:

13 Q. Okay. Let me clarify that. Is it
 14 your opinion that the imputation methodology
 15 used in the AHS for phase 2 non-responders
 16 is unreliable in general, or is your
 17 criticism specific to the use of the
 18 imputation method for glyphosate?

19 MS. FORGIE: Object to the form.

20 THE WITNESS: My criticism is that
 21 this imputation method does not take
 22 into account time varying exposures,
 23 especially dramatically timed varying
 24 exposures. So any pesticide that falls
 25 under the category of huge increase over

1 is not the case when you look at a very
 2 changing exposure environment especially
 3 one like glyphosate where use just
 4 exploded.

5 BY MR. LASKER:

6 Q. For pesticides that continue to be
 7 used but where the prevalence of use did not
 8 increase dramatically, do you have a -- do
 9 you believe that the use of the imputation
 10 methodology for those pesticides is
 11 unreliable?

12 MS. FORGIE: Objection. Asked and
 13 answered.

14 You can answer it again.

15 THE WITNESS: Yes. As much as you
 16 can establish in a baseline whether the
 17 answers are error free or not and then
 18 use that baseline to predict the future
 19 and the future hasn't changed much in
 20 use, you have a reliable method. And I
 21 think for most of these pesticides they
 22 had a reliable method because probably
 23 half of them weren't even used anymore
 24 after baseline, so they already had
 25 everything they needed. All they had to

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1 do is add no exposure. So it's very
 2 easy to have a reliable imputation
 3 method when you basically have no
 4 additional exposure coming, right? This
 5 is very different if an exposure kind of
 6 trickles along and then all of a sudden
 7 rises.
 8 BY MR. LASKER:
 9 Q. I understand that. I just want to
 10 be clear. Pesticides other than glyphosate
 11 where the use was fairly stable through
 12 phase 1 and phase 2, do you believe that the
 13 use of the imputation methodology was
 14 reliable?
 15 MS. FORGIE: Objection. Asked and
 16 answered.
 17 You can answer it again.
 18 THE WITNESS: Imputation works best
 19 when there's no time varying factor
 20 unless you can actually account for the
 21 time varying factor.
 22 BY MR. LASKER:
 23 Q. Okay. Now, a number of these
 24 published studies that we just looked at do
 25 use the imputation methodology with respect

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1 to glyphosate; correct?
 2 MS. FORGIE: Objection. Object to
 3 the form.
 4 THE WITNESS: They're using the
 5 same imputation method for all of the
 6 pesticides, yes.
 7 BY MR. LASKER:
 8 Q. And in a number of these
 9 publications actually use that imputation
 10 methodology to report findings, or in this
 11 case, lack of associations for glyphosate;
 12 correct?
 13 MS. FORGIE: Objection. Object to
 14 the form.
 15 THE WITNESS: I would have to
 16 review all of the results.
 17 BY MR. LASKER:
 18 Q. Let's take a look and go back to
 19 them. If you could look at the paper by --
 20 there's two papers by Koutros.
 21 MS. FORGIE: Two papers by who?
 22 MR. LASKER: Koutros. 2013 and
 23 2016.
 24 MS. FORGIE: So 30-6 and 30-3.
 25 MR. LASKER: Yes.

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1 BY MR. LASKER:
 2 Q. So 30-3, let's look at 30-3. That
 3 would be 2013.
 4 MS. FORGIE: Hold on a second.
 5 Let's make sure we've got the right
 6 ones. Yeah, okay.
 7 BY MR. LASKER:
 8 Q. That is the article "Risk of Total
 9 and Aggressive Prostate Cancer and Pesticide
 10 Use in the Agricultural Health Study." If
 11 you can look to the supplemental tables that
 12 are provided with the study --
 13 MS. FORGIE: Do you have a
 14 page number?
 15 MR. LASKER: They're at the end.
 16 MS. FORGIE: Oh, supplemental. I
 17 didn't hear that.
 18 BY MR. LASKER:
 19 Q. If you go to the web Table 2 at the
 20 end in the second page, that's web Table 1.
 21 You can look at that as well.
 22 MS. FORGIE: But take your time and
 23 look at whatever you need to look at.
 24 BY MR. LASKER:
 25 Q. And --

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1 MS. FORGIE: Wait. She's still
 2 reviewing.
 3 MR. LASKER: That's fine.
 4 THE WITNESS: Yeah, what table?
 5 BY MR. LASKER:
 6 Q. It's Table 2, web Table 2. It has
 7 a list of the different pesticides that are
 8 being studied for prostate cancer.
 9 A. Uh-huh.
 10 Q. And the second page you can see
 11 that they use imputation method to analyze
 12 whether there's association between prostate
 13 cancer and glyphosate in this paper;
 14 correct?
 15 A. The second -- are you referring to
 16 the glyphosate?
 17 Q. Yes.
 18 A. Yeah, okay. Yeah.
 19 MS. FORGIE: What's the question?
 20 BY MR. LASKER:
 21 Q. My question is in the 2013 Koutros
 22 paper, they used the imputation method to
 23 look at the association between glyphosate
 24 and prostate cancer; correct?
 25 A. Yes, that's what they do.

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1 Q. If you can go to 30-6, which is the
 2 Koutros 2016 paper, "Occupational Exposure
 3 to Pesticides and Bladder Cancer Risks," and
 4 if you look on page 796, Table 2, they have
 5 a listing of the different pesticides that
 6 they were looking at with respect to bladder
 7 cancer; correct?
 8 A. Yep.
 9 Q. And in the Koutros 2016
 10 publication, they use the imputation method,
 11 the AHS imputation method to look for an
 12 association between glyphosate exposure and
 13 bladder cancer risk; correct?
 14 MS. FORGIE: Take your time.
 15 THE WITNESS: For every use, yes.
 16 BY MR. LASKER:
 17 Q. And they also have on Table 3, and
 18 this is stratified by smoking status for
 19 reasons specific to the publication --
 20 MS. FORGIE: It was what? I didn't
 21 hear that word.
 22 MR. LASKER: Stratified by smoking
 23 status.
 24 MS. FORGIE: Thank you.
 25 ///

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1 BY MR. LASKER:
 2 Q. If you look at Table 3, the second
 3 page on page 799 of that table, you can see
 4 they also use the imputation method to look
 5 at associations for glyphosate in the dose
 6 response analysis; correct?
 7 A. Yes. And they find a significant
 8 trend for never smokers.
 9 Q. Okay. And do you find that
 10 association to be reliable --
 11 A. No, absolutely not.
 12 MS. FORGIE: Wait, wait. We have
 13 to wait for the question. I'm sorry.
 14 What was the question?
 15 BY MR. LASKER:
 16 Q. She made a comment and I asked
 17 whether she was relying upon a finding for
 18 glyphosate in that study, and that was her
 19 answer.
 20 MS. FORGIE: Objection. I didn't
 21 hear a question and answer.
 22 BY MR. LASKER:
 23 Q. And then Bonner 2017, I think that
 24 is 30-8. If you look at -- this is looking
 25 at pesticide exposure and the incidence of

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1 lung cancer.
 2 MS. FORGIE: Hold on a second.
 3 Sorry.
 4 BY MR. LASKER:
 5 Q. And again there is supplemental
 6 materials in that -- for that publication
 7 with additional analyses. If you look at
 8 table S-3 and the second page of table S-3
 9 in the Bonner 2017 publication, they use the
 10 same AHS imputation methodology to look for
 11 associations between glyphosate use and lung
 12 cancer at various exposure quartiles;
 13 correct?
 14 MS. FORGIE: Object to the form.
 15 THE WITNESS: Yes, they are showing
 16 this, comparing non-exposed to exposed.
 17 BY MR. LASKER:
 18 Q. And, of course, the 2018 JNCI study
 19 of glyphosate-based herbicides and cancers
 20 including non-Hodgkin's lymphoma, that used
 21 the same imputation methodology in looking
 22 at the association between glyphosate and
 23 various types of cancers; correct?
 24 MS. FORGIE: Object to the form.
 25 THE WITNESS: They always use the

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1 same imputation method. That doesn't
 2 make it right.
 3 BY MR. LASKER:
 4 Q. But we have four different
 5 peer-reviewed publications now where the AHS
 6 imputation methodology has been used in
 7 looking at associations between glyphosate
 8 and various kinds of cancer; correct?
 9 MS. FORGIE: Object to the form.
 10 THE WITNESS: Most of these
 11 glyphosate results were in supplements.
 12 The papers refer to their positive
 13 findings. They give the negative
 14 findings which is very appropriate in a
 15 supplement, and generally, you do not
 16 generate in science a big brouhaha over
 17 nothing. You always generate a brouhaha
 18 when there is actually a positive
 19 finding and somebody thinks you
 20 shouldn't have a positive finding. For
 21 all the studies that were done bad
 22 enough so we have no findings, nobody
 23 complains, and that's a problem.
 24 BY MR. LASKER:
 25 Q. Let me just ask this question, I

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

7 MS. FORGIE: Object to the form.

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

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

8 BY MR. LASKER:

9 Q. Just to be clear and the documents
10 will speak for themselves, putting aside the
11 2018 JNCI study, the three other studies
12 that looked at a glyphosate using the same
13 imputation methodology were all studies like
14 the 2014 publication on fungicides that
15 looked at a broad range of different
16 pesticides to determine whether there was
17 associations with any of the pesticides that
18 they examined; correct?

19 MS. FORGIE: Object to the form.

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

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

13 BY MR. LASKER:

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

23 MS. FORGIE: Object to the form.

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

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

7 BY MR. LASKER:

8 Q. Now, as you've already said, your
9 concern about glyphosate and the use of the
10 imputation methodology was the increase in
11 glyphosate use -- the significant increase
12 in glyphosate use between phase 1 and phase
13 2 of the questionnaire; correct?

14 MS. FORGIE: Object to the form.

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

18 BY MR. LASKER:

19 Q. Through the phase 2 period?

20 A. Yes.

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

24 A. The GMO crop use.

25 Q. We're talking about Roundup Ready

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

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

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1 BY MR. LASKER:
 2 Q. This is, for the record, an article
 3 or study by Charles M. Benbrook "Trend in
 4 Glyphosate Use in the United States and
 5 Globally." This is an article you cited in
 6 your supplemental expert report; correct?
 7 A. Uh-huh, yes.
 8 Q. At page 3 of this Benbrook article,
 9 there is a time trend that looks at the
 10 percentage of acres treated with glyphosate
 11 by year for soybean; correct?
 12 A. Yes, for soybean.
 13 Q. And soybean -- soybeans are --
 14 soybeans is, soybeans are -- soybeans is one
 15 of the leading crops grown by the pesticide
 16 applicators in the AHS cohort; correct?
 17 MS. FORGIE: Objection. Object to
 18 the form.
 19 THE WITNESS: In Iowa and North
 20 Carolina?
 21 BY MR. LASKER:
 22 Q. Well, for example, in Iowa roughly
 23 80 percent of the cohort members grew
 24 soybeans; correct?
 25 MS. FORGIE: Object to the form.

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1 THE WITNESS: That may be, but they
 2 have varied crop use; so it's not just
 3 soybeans.
 4 BY MR. LASKER:
 5 Q. And by 2005 as reported in
 6 Benbrook, we know that virtually all of the
 7 AHS cohort members who grew soybeans would
 8 have had exposure to glyphosate; correct?
 9 MS. FORGIE: What was the date you
 10 gave?
 11 MR. LASKER: By 2005.
 12 MS. FORGIE: Would you read that
 13 question back, please.
 14 (Record read by the reporter as
 15 follows:
 16 "QUESTION: And by 2005 as
 17 reported in Benbrook, we know
 18 that virtually all of the AHS
 19 cohort members who grew soybeans
 20 would have had exposure to
 21 glyphosate; correct?"
 22 MS. FORGIE: Object to the form.
 23 THE WITNESS: Actually, we don't
 24 know that because he's not referring to
 25 the AHS.

1 BY MR. LASKER:

2 Q. Yes, but in his table on Figure 2,
3 he reports that 90 percent of all soybeans
4 farmed in the United States --

5 MR. BAUM: Figure 2?

6 MR. LASKER: I'm sorry. Figure 1.
7 Figure 1A.

8 BY MR. LASKER:

9 Q. 90 percent of all soybeans farmed
10 in the United States by 2005 was being --
11 were being treated with glyphosate; correct?

12 MS. FORGIE: Object to the form.

13 THE WITNESS: It's per acres. I
14 don't know whether the acres refer to
15 all soybeans other than in Iowa. This
16 is the U.S.

17 BY MR. LASKER:

18 Q. Right. In the United States,
19 90 percent of all acres of soybeans were
20 being treated with glyphosate; correct?

21 MS. FORGIE: Object to the form.

22 BY MR. LASKER:

23 Q. By June, 2005.

24 A. Probably 80 or 90.

25 Q. And for a farmer who was growing

1 soybeans during this phase 2 period, given
2 this high prevalence of glyphosate use on
3 soybeans, we can have fairly high confidence
4 that they would have been using glyphosate;
5 correct?

6 MS. FORGIE: Object to the form.

7 THE WITNESS: That would depend on
8 whether the farmer applied himself or
9 hired a company to apply or hired farm
10 workers to apply.

11 BY MR. LASKER:

12 Q. Sure. But for the AHS cohort we're
13 dealing with pesticide applicators by
14 definition; correct?

15 MS. FORGIE: Object to the form.

16 THE WITNESS: We are dealing with
17 pesticide applicators at enrollment. We
18 are not dealing with pesticide
19 applicators necessarily at follow-up.
20 They might be retired. They might have
21 changed their farming practices. They
22 may have hired people to farm for them.
23 All of these are very relevant
24 questions.

25 ///

1 BY MR. LASKER:

2 Q. Okay. But to the extent that the
3 individuals in the cohort continued to be
4 farmers, and they were farming their own
5 land, if they were farming soybeans in 2005,
6 we can say given these statistics in
7 Benbrook of the almost 90 percent usage of
8 glyphosate on soybeans, that those Farmers
9 would have been applying glyphosate;
10 correct?

11 MS. FORGIE: Object to the form.
12 Calls for speculation.

13 THE WITNESS: We might be able to
14 say that for 2005, but we might not be
15 able to say that for 200 -- '92 through
16 2005 because there's a rise, and we
17 absolutely don't know when the farmers
18 started using.

19 BY MR. LASKER:

20 Q. We would know that a soybean farmer
21 who was still farming in 2005 would likely
22 have exposure to glyphosate regardless of
23 whether they filled out a phase 2
24 questionnaire; correct?

25 MS. FORGIE: Object to the form.

1 THE WITNESS: I would not say so.
2 Again, he might have given the equipment
3 to his son to now spray or rented it out
4 because we know that farming practices
5 with GMOs changed quite a bit, and, you
6 know, you might hire a little airplane
7 to fly over and spray instead of going
8 around with your backpack sprayer.

9 MS. FORGIE: Were you finished?

10 THE WITNESS: Uh-huh.

11 BY MR. LASKER:

12 Q. To the extent that the AHS cohort
13 member continued to be farming his own land
14 and he was a soybean farmer, we would have
15 fairly strong confidence that that soybean
16 farmer was exposed to glyphosate in 2005
17 whether or not they filled out a phase 2
18 questionnaire or not; correct?

19 MS. FORGIE: Object to the form.

20 Asked and answered.

21 You can answer it again.

22 THE WITNESS: You can make a strong
23 guess, but you wouldn't know.

24 BY MR. LASKER:

25 Q. And the -- given that fact that one

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

6 MS. FORGIE: Object to the form.

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

21 BY MR. LASKER:

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

1 a lot of different assumption. They can
2 make the assumption that that farmer
3 must have switched in 1995 straight
4 away, was exposed for 10 years until
5 2005, or he switched over in 2004 or '05
6 and was exposed for one year. That
7 makes a big difference in intensity
8 rating.

9 BY MR. LASKER:

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

22 MS. FERGIE: Object to the form.

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

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

6 MR. BAUM: Object to the form.

7 Asked and answered.

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

10 You can answer it again.

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

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

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

12 MS. FORGIE: Object to the form.

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

16 BY MR. LASKER:

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

23 A. Yes, yes.

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

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

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1 BY MR. LASKER:
 2 Q. Okay. Well, regardless -- when you
 3 say "they asked about it," you're talking
 4 about the --
 5 A. In the follow-up question --
 6 MS. FORGIE: Wait, wait, there's
 7 got to be questions and answers.
 8 BY MR. LASKER:
 9 Q. With respect to the -- I understand
 10 whatever is in the questionnaire, I'm
 11 talking about what actually would be
 12 happening with these farmers. One of the
 13 questions was how many days per year per use
 14 in that reference year for phase 2; correct?
 15 MS. FORGIE: Object to the form.
 16 THE WITNESS: It asked the same
 17 questions as at baseline but only
 18 referred to about a 12-month period,
 19 yes.
 20 BY MR. LASKER:
 21 Q. And for farmers who farm Roundup
 22 Ready crops and, of course, we have
 23 63 percent of the cohort who responded to
 24 the phase 2 questionnaire, we would -- if
 25 those 63 percent, we would see that those

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

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

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1 the question.
 2 BY MR. LASKER:
 3 Q. We have information from the
 4 63 percent who filled out the questionnaire
 5 about these intensity factors, what
 6 protective equipment gear they used, how
 7 much they mixed the pesticide, all of those
 8 questions were asked, and for the 63 percent
 9 of the cohort we would have that
 10 information; correct?
 11 MS. FORGIE: Object to the form.
 12 THE WITNESS: In fact, we might
 13 not, and the reason is that this
 14 question about protective gear and
 15 equipment was asked for all pesticides,
 16 not specifically for glyphosate. So we
 17 have absolutely no idea what they did
 18 with glyphosate.
 19 BY MR. LASKER:
 20 Q. But to the extent that we have
 21 information and that this is, I take it, an
 22 issue that you would have for all pesticides
 23 with respect to the information on foot
 24 protective gear and mixing within the AHS;
 25 correct?

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1 MS. FORGIE: Object to the form.
 2 THE WITNESS: Yes and no. Because
 3 you can imagine that when you ask these
 4 questions, the farmer will refer to the
 5 most used pesticide.
 6 BY MR. LASKER:
 7 Q. Okay.
 8 A. Or the most toxic.
 9 Q. For the most used pesticide I think
 10 we can be -- I think you've said this. The
 11 most used pesticide certainly during this
 12 phase 2 period was glyphosate; correct?
 13 MS. FORGIE: Objection to the form.
 14 THE WITNESS: It is -- glyphosate
 15 is certainly highly used, but it is
 16 never the only pesticide any of these
 17 farmers used.
 18 BY MR. LASKER:
 19 Q. I understand --
 20 MS. FORGIE: Wait, let her finish.
 21 THE WITNESS: Farmers expect
 22 glyphosate that's a weedkiller and not
 23 acutely toxic to them or doesn't induce
 24 any symptoms, they don't expect that to
 25 make them as sick as other pesticides

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1 against which they have been warned
 2 throughout their lives like the OPs that
 3 are neurotoxic and that make them feel
 4 bad. So whatever protective equipment
 5 they are reporting, they are most likely
 6 reporting for the most toxic pesticide.
 7 BY MR. LASKER:
 8 Q. All right. So previously you had
 9 stated -- the record will reflect if it's
 10 correct or not, that you thought the farmers
 11 would be reporting their application method,
 12 their protective gear for the pesticide they
 13 used the most or the pesticide that's most
 14 toxic, and now it's your opinion that they
 15 would be reporting their protective
 16 equipment only for the pesticide that they
 17 think is most toxic; is that correct?
 18 MS. FORGIE: Objection.
 19 Mischaracterizes her testimony.
 20 THE WITNESS: It is whatever they
 21 remember using it for, and my guess is
 22 that what they remember the best is the
 23 most toxic and/or the most used.
 24 BY MR. LASKER:
 25 Q. To the extent that they're

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1 reporting their protective equipment and
 2 application methods with respect to the
 3 pesticide that's most used for a Roundup
 4 Ready farmer, then that information that's
 5 provided for the 63 percent that filled out
 6 the phase 2 questionnaire would reflect that
 7 change that occurred when they started
 8 farming with Roundup Ready crops; correct?
 9 MS. FORGIE: Object to the form.
 10 THE WITNESS: Well, again, they
 11 only reported for one year.
 12 BY MR. LASKER:
 13 Q. Right. And for that one year the
 14 information that's provided with respect to
 15 application method, protective gear would
 16 reflect their application method for
 17 glyphosate; correct?
 18 MS. FORGIE: Objection.
 19 Mischaracterizes her testimony, asked
 20 and answered.
 21 THE WITNESS: I cannot speculate
 22 about this because we all know that
 23 these farmers get more and more
 24 information about the hazards of
 25 pesticides. So they may have at any

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1 point in time changed their application
 2 methods and/or protective equipment use
 3 and we don't know it because it's only
 4 reported for the last year. Especially
 5 the ones in the AHS study because they
 6 are constantly bombarded with
 7 information from the study about the
 8 hazards of pesticides. So we have no
 9 idea who changed what.
 10 BY MR. LASKER:
 11 Q. But while -- am I correct in my
 12 understanding, though, that you believe
 13 while this is speculation on your part, that
 14 the information would be unreliable for
 15 glyphosate but not unreliable for other
 16 pesticides?
 17 MS. FORGIE: Objection.
 18 Mischaracterizes the testimony, asked
 19 and answered.
 20 THE WITNESS: I would have to
 21 answer that for every single pesticide
 22 because every pesticide has a different
 23 scenario, just like every cancer is not
 24 the same cancer.
 25 ///

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1 BY MR. LASKER:
 2 Q. So with respect to this concern
 3 that you have for the imputation
 4 methodology, this is a concern that is for
 5 all pesticides, not just glyphosate; is that
 6 correct?
 7 A. That's not what I said.
 8 Q. That's why I'm asking the question.
 9 MS. FORGIE: So wait. Let's get
 10 the question.
 11 BY MR. LASKER:
 12 Q. Let me ask the question again. Am
 13 I correct in my understanding, maybe I'm
 14 not, of your last answer that your concern
 15 about the fact that these farmers could be
 16 changing their application methods or
 17 their -- over time, is that a concern that
 18 is unique to glyphosate, or do you think
 19 that applies to all the pesticides where
 20 there's imputed information in the AHS
 21 study?
 22 MS. FORGIE: Object to the form.
 23 Also asked and answered.
 24 You can answer it again.
 25 THE WITNESS: It will be a

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1 difficult one to answer, although my
 2 guess is since these are trained
 3 pesticide applicators, they are trained
 4 in which pesticides to recognize as most
 5 toxic and acutely toxic and also where
 6 they warned you should be wearing
 7 protective equipment, where other
 8 pesticides may not be considered as
 9 toxic and so they are not using the same
 10 precautions.
 11 BY MR. LASKER:
 12 Q. Do you know how these pesticide
 13 applicators were trained with respect to
 14 what protective gear to use in connection
 15 with which pesticides?
 16 A. That is what they had to answer
 17 during their application exam.
 18 Q. That wasn't my question. My
 19 question is do you know how these farmers
 20 were trained with respect to what protective
 21 gear they should wear with respect to which
 22 pesticide?
 23 MS. FORGIE: Objection. Asked and
 24 answered.
 25 You can answer it again.

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1 THE WITNESS: I would imagine that
 2 they did; otherwise, I would think that
 3 these Ag Health specialists didn't do
 4 their jobs.
 5 BY MR. LASKER:
 6 Q. I'm not asking the question
 7 correctly. I'm sorry. I'm not asking you
 8 whether or not these people did receive
 9 training. My question is do you, Dr. Ritz,
 10 know what the training was that they
 11 received, for example, with respect to what
 12 protective gear you should wear while
 13 applying glyphosate?
 14 MS. FERGIE: Objection. Asked and
 15 answered.
 16 You can answer.
 17 A. I was not part of that field work
 18 of the AHS study, so I wouldn't know that
 19 exactly. But I would imagine that the Ag
 20 Health educators are not different in
 21 California from Iowa and North Carolina in
 22 that they are doing their job, which is to
 23 teach these people exactly about the hazards
 24 of individual pesticides because they are
 25 also teaching them what pesticide to use for

1 what purpose and then to teach them also how
2 to protect themselves.

3 Q. And do you have any knowledge --

4 MS. FORGIE: When you get -- we've
5 been going over an hour. When it's
6 convenient for you I'd like to take a
7 biology break.

8 MR. LASKER: Let me just finish
9 this.

10 MS. FORGIE: Of course.

11 BY MR. LASKER:

12 Q. Okay. Do you have in California or
13 elsewhere, I don't care where it is, do you
14 have an independent knowledge, Dr. Ritz, as
15 to what instructions are for pesticide
16 applicators with respect to the protective
17 gear to be used while applying glyphosate to
18 Roundup Ready crops?

19 MS. FORGIE: Object to the form.

20 You can answer.

21 THE WITNESS: I wouldn't know
22 exactly, but my guess would be that you
23 use the usual precautions but not
24 necessarily a respirator or any
25 equipment that you would want to use for

1 what was done. So in the AHS they had the
2 phase 1 survey which was from 1993 to 1997,
3 and they obtained questionnaire responses
4 from 54,251 members of the cohort; correct?

5 MS. FORGIE: I object to the form,
6 and I object to the use of this that she
7 has not reviewed, and it is drawn by
8 counsel.

9 BY MR. LASKER:

10 Q. Dr. Ritz?

11 MS. FORGIE: Wait. Give her a few
12 minutes to look at it, please.

13 MR. LASKER: Sure.

14 MS. FORGIE: Thanks.

15 THE WITNESS: So this shows that
16 exposure data from both phases were used
17 to impute exposure data on individuals
18 who did not respond to phase 2, yes.

19 BY MR. LASKER:

20 Q. So I just want to walk through so
21 other people can follow this. I know you
22 understand this. I think I do. But the
23 judge and the jury may have some difficulty.

24 MS. FORGIE: You meant me, didn't
25 you?

1 highly volatile pesticides. It's more
2 the general protective gear.

3 MR. LASKER: We can take a break.

4 MS. FORGIE: Thank you.

5 THE VIDEOGRAPHER: We are off the
6 record at 2:05 p.m.

7 (Recess taken from 2:05 p.m.
8 to 2:39 p.m.)

9 THE VIDEOGRAPHER: We are back on
10 the record at 2:39 p.m.

11 BY MR. LASKER:

12 Q. Dr. Ritz, welcome back. We've been
13 talking about the imputation method used in
14 the AHS, and I want to just make sure we
15 have a common framework so everybody sort of
16 schematically understands what was done. So
17 I created a sort of a visual. If I could,
18 I'd like to walk through this with you.

19 (Exhibit Number 30-10 was
20 marked for identification.)

21 BY MR. LASKER:

22 Q. I understand that you have
23 criticisms of how the methodology worked
24 with respect to glyphosate, but I wanted to
25 make sure we have a common understanding of

1 BY MR. LASKER:

2 Q. We have the phase 1 survey from
3 1993 to 1997 and questionnaires were filled
4 out by 54,251 members of the cohort;
5 correct?

6 MS. FORGIE: Object to the form and
7 the dates on there.

8 THE WITNESS: In that time period?
9 Well, there were actually more
10 responses, but those were the ones, I
11 believe, that are used most of the time
12 in the analyses because they clean out
13 people from -- they drop people from
14 analyses because they already had either
15 disease at baseline or they missed other
16 variables.

17 BY MR. LASKER:

18 Q. And then in the phase 2 survey as
19 we've discussed, there were 63 percent of
20 that group or 34,698 who filled out
21 questionnaire responses in that phase 2
22 survey which was given in that 1999 to 2005
23 time period; correct?

24 MS. FORGIE: Again, I object to the
25 form. This isn't a memory test. I

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1 think she would have the publication in
 2 front of her, please.
 3 THE WITNESS: Yeah, I do recall it
 4 was about 34,000 individuals who did
 5 respond to a CATI interview.
 6 BY MR. LASKER:
 7 Q. And then the imputation was with
 8 respect to the remainder which was the
 9 19,553 who did not respond to the phase 2
 10 survey, and we have that in the dotted line;
 11 correct?
 12 MS. FORGIE: Again, I object to
 13 using these figures without her having
 14 access to the publication.
 15 THE WITNESS: I imagine that that's
 16 the number of individuals, yes.
 17 MR. LASKER: This will be 30-11,
 18 and this is the 2018 JNCI article;
 19 right?
 20 (Exhibit Number 30-11 was
 21 marked for identification.)
 22 THE WITNESS: Yes.
 23 BY MR. LASKER:
 24 Q. So if you look at page 3 results,
 25 you'll see among 54,251 participants.

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1 That's the number we have for the cohort;
 2 correct?
 3 A. Yes.
 4 Q. And then on page 4 on the 2018
 5 JNCI, again, they discuss in the column that
 6 goes down on that page the first indent in
 7 the primary analysis. Again, it's the
 8 54,251 applicators.
 9 Do you see that?
 10 A. Yes.
 11 Q. And then if you go down about
 12 halfway further down, you will see that
 13 there was 34,698 individuals who responded
 14 to both phase 1 and phase 2 questionnaires;
 15 correct?
 16 MS. FORGIE: Object to the form.
 17 THE WITNESS: Yes.
 18 BY MR. LASKER:
 19 Q. Okay. And then what was done with
 20 respect to the imputation methodology, and I
 21 know we have further questions about how it
 22 was done, but the imputation methodology
 23 takes questionnaire responses from the
 24 individuals who responded to phase 1, both
 25 the folks who then did respond to phase 2

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1 and those who did not. And they also take
 2 questionnaire responses for the 34,698
 3 individuals who responded to the phase 2
 4 survey, and they use those questionnaire
 5 responses to impute exposure data for the
 6 individuals who did not respond to phase 2.
 7 That's the sort of the basic methodology;
 8 correct?
 9 A. Yes. That's about the estimation
 10 procedure, yeah.
 11 Q. And then they -- when forwarded in
 12 time for purposes of the 2018 NCI study to
 13 2013 for health outcomes which in this case
 14 was cancer outcomes; correct?
 15 A. They do what?
 16 Q. They measure cancer outcomes going
 17 to 2012 or 2013 --
 18 A. Depending on the state, yes.
 19 Q. And the health outcome information,
 20 that is obtained from separate healthcare
 21 databases. It's not for the cancer outcomes
 22 in the 2018 NCI study; correct?
 23 MS. FORGIE: Object to the form.
 24 THE WITNESS: Correct.
 25 ///

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

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1 THE WITNESS: It shows the highest
 2 exposure quartile compared with the
 3 non-exposed as the reference category.
 4 BY MR. LASKER:
 5 Q. And that's the number that's on the
 6 bottom on this table that I put up on the
 7 screen; correct?
 8 MS. FORGIE: Object to --
 9 BY MR. LASKER:
 10 Q. 0.87, 0.64 to 1.2; correct?
 11 MS. FORGIE: Object to the form.
 12 Mischaracterizes the data.
 13 THE WITNESS: It's the same
 14 numbers.
 15 BY MR. LASKER:
 16 Q. Okay. Now the investigators
 17 then -- and this is discussed on page 4 of
 18 the paper -- do a number of sensitivity
 19 analyses. I want to walk through them and
 20 make sure we have a common understanding of
 21 what was done. So we'll mark this -- this
 22 is now 30-12.
 23 (Exhibit Number 30-12 was
 24 marked for identification.)
 25 ///

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1 BY MR. LASKER:
 2 Q. We'll put this on the screen and
 3 take a snapshot of that as well.
 4 MR. LASKER: 30-Exhibit 11 was the
 5 2018 NCI study. This is 30-12.
 6 MS. FORGIE: And this one is 30-12.
 7 Okay.
 8 BY MR. LASKER:
 9 Q. So for 30-12, this is on page 4 of
 10 the NCI study, they talk about different
 11 sensitivity analyses that they conducted
 12 with their data; correct?
 13 MS. FORGIE: And, again, I object
 14 to the use of this form created by
 15 counsel without her having a chance to
 16 review.
 17 You can go ahead and review this in
 18 comparison to the study which is 30-11.
 19 THE WITNESS: So where does this
 20 number come from?
 21 BY MR. LASKER:
 22 Q. That's the question I want to walk
 23 through with you. So on page 4 of the 2018
 24 JNCI study, in the right-hand -- left-hand
 25 column, I'm sorry, they talk about that

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1 indent in the primary analysis include
 2 exposure information --
 3 MS. FORGIE: Wait, wait. Can you
 4 read it a little slower, please.
 5 MR. LASKER: I'm just positioning
 6 you on the page.
 7 MS. FORGIE: That's what I'm trying
 8 to find.
 9 MR. LASKER: In the primary
 10 analysis. I'm just getting you in the
 11 right paragraph.
 12 MS. FORGIE: Okay.
 13 BY MR. LASKER:
 14 Q. And then they talk about in the
 15 course of that paragraph a number of
 16 sensitivity analyses they conducted on the
 17 data; correct, Dr. Ritz?
 18 A. Yes, they conducted sensitivity
 19 analyses and they describe them.
 20 Q. So the first sensitivity analysis
 21 that they discuss is that they restricted
 22 the exposure data only to information that
 23 they obtained in the phase 1 questionnaire;
 24 correct?
 25 A. Yes.

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1 MS. FORGIE: Object to the form.
 2 BY MR. LASKER:
 3 Q. So that's what we have depicted
 4 here. So this is now just data information
 5 from the phase 1 questionnaire; correct?
 6 That's all actual questionnaire responses in
 7 phase 1 for the 54,251 individuals in the
 8 cohort; correct?
 9 A. That's correct.
 10 Q. And then from using only that
 11 actual questionnaire data, they then looked
 12 at the cancer outcomes related to those
 13 members of the cohort. And for their
 14 highest quartile of exposure, again,
 15 corresponding to the highest quartile
 16 exposure we looked at for the primary
 17 analysis, they reported that their rate
 18 ratio without using any of the imputed data
 19 was 0.82 with 95 confidence interval of 0.62
 20 to 1.8; correct?
 21 A. Yes.
 22 Q. Okay. The second sensitivity
 23 analysis --
 24 MS. FORGIE: By the way, I object
 25 to showing this in this way. This is a

1 much longer period of time.

2 MR. LASKER: I'm sorry. Which --

3 MS. FORGIE: Wait, let her explain.

4 THE WITNESS: This ten line, 30-12
5 but also 30-10. You can see that
6 between 1974 and 1993 there's a broken
7 line.

8 BY MR. LASKER:

9 Q. Right.

10 A. That reflects that we're leaving
11 years out. But between 2005 and 2013 that's
12 not the case. It looks like that time
13 period is fairly small. It's not.

14 Q. That's fine. But the years that
15 are actually written down here, 1974 to
16 1993, 1997, 1999, 2005, and 2013, those
17 years are accurate; correct?

18 MS. FORGIE: Objection. She's
19 already stated that 2000 -- well,
20 objection. She's already stated there's
21 a problem.

22 MR. LASKER: Objection is noted.

23 THE WITNESS: They are accurate
24 to -- in a certain sense because they
25 are also ignoring that one of the states

1 graphic?

2 MS. FORGIE: Object to the form.

3 THE WITNESS: Actually, I'm
4 objecting to how this is referenced.

5 BY MR. LASKER:

6 Q. Let's go back to that. I want to
7 make sure I understand.

8 MS. FORGIE: Tell him the reference
9 number.

10 THE WITNESS: It's 30-10.

11 BY MR. LASKER:

12 Q. Yes.

13 A. Because this image makes it look as
14 if they reported for the whole period, and
15 they clearly didn't.

16 Q. Okay.

17 A. So these individuals reported for
18 the 12-month period depending on in which
19 year they were interviewed. So we have gaps
20 in exposure assessment.

21 Q. But the phase 2 survey was, and
22 obviously we have to be able to look forward
23 in the box. I understand that. But the
24 phase 2 survey was provided during the years
25 1999 and 2005 and in that questionnaire the

1 finished at 2012, not '13.

2 BY MR. LASKER:

3 Q. Okay. But other than that one
4 date, the other dates are accurate on
5 this --

6 A. Depending on what they depict. I
7 don't know.

8 Q. I should clarify. 1974 is the date
9 that glyphosate-based herbicides were first
10 approved for use in the United States;
11 correct?

12 MS. FORGIE: Object to the form.

13 THE WITNESS: Yes.

14 BY MR. LASKER:

15 Q. And in the phase 1 survey, the
16 individuals who provided questionnaire
17 responses were providing information on
18 historical use of glyphosate, which at the
19 maximum could extend back to 1974; correct?

20 MS. FORGIE: Object to the form.

21 THE WITNESS: Correct.

22 BY MR. LASKER:

23 Q. Do you have any other concerns with
24 the -- how this first sensitivity analysis
25 is depicted on this graph -- on this

1 individuals provided information for one
2 reference year, their most recent year of
3 pesticide use; correct?

4 MS. FORGIE: Object to the form.

5 THE WITNESS: The most recent year
6 of farming, yes.

7 BY MR. LASKER:

8 Q. Okay. Let's go to 30 --

9 A. It's not pesticide use. That's
10 important.

11 Q. It's farming.

12 A. It's farming.

13 Q. And then they provided responses
14 with respect to pesticide use during that
15 year?

16 A. Yes.

17 Q. Understood. 30-13 then is the
18 second sensitivity analysis that was
19 conducted in the JNCI.

20 (Exhibit Number 30-13 was
21 marked for identification.)

22 MS. FORGIE: I don't think we have
23 a 30-13.

24 MR. LASKER: Here. I don't think I
25 handed that out. My mistake.

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1 (Discussion off the record.)
 2 BY MR. LASKER:
 3 Q. This is the second sensitivity
 4 analysis they conducted in the 2018 NCI
 5 study was they only looked at the
 6 individuals who responded to both the phase
 7 1 and phase 2 surveys; correct?
 8 MS. FORGIE: Again, objection to
 9 using this 30-13 along with 30-10 and
 10 30-12 created by counsel that she's
 11 never had a chance to look at, and I
 12 object to that.
 13 THE WITNESS: It's the same number,
 14 so I imagine these are the individuals
 15 with the exposure data at baseline and
 16 for the 12-month period at follow-up.
 17 BY MR. LASKER:
 18 Q. And what the investigators did in
 19 the 2018 NCI study is looking solely at
 20 these questionnaire responses in phase 1 and
 21 phase 2. And, again, not looking at any
 22 imputed data, they calculated the rate ratio
 23 for non-Hodgkin's lymphoma from exposure to
 24 glyphosate going out to 2012 or 2013 and
 25 they found that for the highest quartile

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

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1 judge understands the sensitivity analysis
 2 that was conducted. For this sensitivity
 3 analysis, the investigators looked only at
 4 actual questionnaire response data from
 5 phase 1 and phase 2 for the members of the
 6 cohort that provided answers to both
 7 questionnaires; correct?
 8 MS. FORGIE: Objection. And are
 9 you talking about 30-13 or 30-12?
 10 MR. LASKER: This is 30-13.
 11 MS. FORGIE: Okay.
 12 THE WITNESS: So they are using
 13 actual data. However, that actual data
 14 has many, many holes as we know because
 15 they are only asking about a 12-month
 16 period and guess whatever happened in
 17 the interim when glyphosate use changed
 18 considerably.
 19 BY MR. LASKER:
 20 Q. But for this sensitivity analysis 2
 21 using only actual questionnaire data for
 22 34,698 individuals in the phase 1 and phase
 23 2 survey, they found a rate ratio for the
 24 highest quartile of exposure of 0.9 at the
 25 rate of confidential of 0.63 to 1.27;

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1 correct?
 2 MS. FORGIE: Object to the form.
 3 THE WITNESS: They found in highest
 4 quartile odds ratio or hazard ratio, I
 5 guess, comparing to the unexposed, and I
 6 have concerns about that as I have large
 7 concerns about using this data as if
 8 it's the truth. It's not.
 9 BY MR. LASKER:
 10 Q. Let's go to the next sensitivity
 11 analysis. This will be 30-14.
 12 (Exhibit Number 30-14 was
 13 marked for identification.)
 14 BY MR. LASKER:
 15 Q. This document shows the third
 16 sensitivity analysis that the JNCI
 17 investigators conducted in their
 18 publication; correct?
 19 MS. FORGIE: Object to the form and
 20 the reference as it is the third
 21 sensitivity analysis. Again, I object
 22 to counsel showing her a document that
 23 she's never had a chance to see before
 24 or compare.
 25 THE WITNESS: Could you walk me

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1 through what this is?
 2 BY MR. LASKER:
 3 Q. Sure. The third sensitivity
 4 analysis, and it's page 4 of the JNCI
 5 article. The investigators truncated their
 6 cancer incidence data. Instead of extending
 7 it out to 2013, they brought it back to
 8 2005; correct?
 9 MS. FORGIE: Objection. Object to
 10 form.
 11 THE WITNESS: Yes, they excluded
 12 all cancer incidences after 2005.
 13 BY MR. LASKER:
 14 Q. So to the extent there were changes
 15 in exposure after 2005, either incidence or
 16 intensity, that information is no longer
 17 part of this analysis because the cancer now
 18 has a cutoff of 2005; correct?
 19 MS. FORGIE: Object to the form.
 20 THE WITNESS: Any exposure changes
 21 after 2005 would now be eliminated, but
 22 not any before.
 23 BY MR. LASKER:
 24 Q. Right. And using that sensitivity
 25 analysis when they looked at the rate ratio

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1 in their highest exposure quartile, again,
 2 they found no association between glyphosate
 3 exposure and non-Hodgkin's lymphoma;
 4 correct?
 5 MS. FORGIE: Object to the form.
 6 Mischaracterizes the data from the
 7 study.
 8 THE WITNESS: Well, in this highest
 9 exposure quartile, we are finally on the
 10 right side of the equation. We get a
 11 1.04 meaning it's not protected against
 12 NHL anymore and tells you they are
 13 starting to maybe look at the right
 14 follow-up period where they have the
 15 best data for which is really a very
 16 short period.
 17 BY MR. LASKER:
 18 Q. So is it your testimony, or let me
 19 make sure I understand. Is it your
 20 testimony that this analysis with a rate
 21 ratio of 1.04 confidence interval of 0.7 to
 22 1.57 is suggestive of a causal link between
 23 glyphosate exposure and non-Hodgkin's
 24 lymphoma?
 25 A. What I'm saying is that I don't

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

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1 to agree that glyphosate prevents NHL.
 2 BY MR. LASKER:
 3 Q. Is it your testimony that any of
 4 the rate ratios reported in the 2018 NCI
 5 study are statistically significant evidence
 6 of a protective effect?
 7 MS. FORGIE: Object to the form.
 8 THE WITNESS: Of a protective
 9 effect?
 10 BY MR. LASKER:
 11 Q. Yes.
 12 A. For glyphosate?
 13 Q. Yes.
 14 MS. FORGIE: Could you read the
 15 question back again, please.
 16 THE WITNESS: I don't understand
 17 this.
 18 BY MR. LASKER:
 19 Q. I'll restate the question.
 20 You're talking about the fact that
 21 the other rate ratios reported that we've
 22 looked at are below 1.
 23 A. Uh-huh.
 24 Q. None of those rate ratios are
 25 statistically significant; correct?

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

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

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1 yes.
 2 Q. I understand that it's your opinion
 3 that there was non-differential exposure
 4 misclassification in this study. Is it your
 5 belief that Monsanto's experts believe that
 6 there was non-differential exposure
 7 misclassification in the study?
 8 MS. FORGIE: Objection. Object to
 9 the form. Also I think it would be
 10 helpful if she could look at the Heltshe
 11 Ryder reports or Acquavella. I don't
 12 know which experts you're referring to.
 13 THE WITNESS: Which experts?
 14 BY MR. LASKER:
 15 Q. I'm sorry. This is something you
 16 stated. I want to understand the testimony
 17 you just provided. Is it your understanding
 18 that any of Monsanto's experts have opined
 19 that there was non-differential exposure
 20 misclassification in the 2018 NCI study?
 21 MS. FORGIE: Object to the form,
 22 asked and answered.
 23 THE WITNESS: They are trying very
 24 hard to say that's not the case.
 25 ///

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1 BY MR. LASKER:
 2 Q. And if there is no non-differential
 3 exposure misclassification in the JNCI
 4 study, then there is no biasing towards the
 5 null; correct?
 6 MS. FORGIE: Object to the form.
 7 THE WITNESS: That's not correct.
 8 There are many other biases that can
 9 move the estimate towards the one
 10 including confounding. That's not
 11 adjusted for.
 12 BY MR. LASKER:
 13 Q. Is it your understanding that
 14 the -- strike that.
 15 Do you believe that there is bias
 16 in the 2018 JNCI study that is biasing the
 17 reported rate ratios away from the null?
 18 A. Away from the null in what
 19 direction?
 20 Q. Either direction.
 21 A. Like below? Below the --
 22 Q. Below or above.
 23 MS. FORGIE: Object to the form.
 24 THE WITNESS: There is certainly
 25 bias that is shown here that moves

1 estimates below the 1, yes. That's a
2 biased estimate.

3 BY MR. LASKER:

4 Q. My question is can you identify for
5 me any specific bias that you believe
6 occurred in the 2018 JNCI study that you
7 believe biased the reported rate ratio away
8 from the null?

9 MS. FORGIE: Objection. Asked and
10 answered.

11 You can answer it again.

12 THE WITNESS: Yes, indeed.

13 Confounding is the most likely one
14 because you're comparing an unexposed
15 group that I believe is not in the sense
16 of the causal inference that we try to
17 make fully exchangeable with the exposed
18 group.

19 BY MR. LASKER:

20 Q. So is the --

21 MS. FORGIE: Wait. Let her finish.

22 THE WITNESS: They have not
23 adjusted for all the variables because
24 we don't really know in every single way
25 how these two differ.

1 The best way to actually check that
2 is by using only exposed. That's what
3 Anneclaire DeRoos did. She looked at
4 the low exposure versus high exposure.
5 She left it specifically because she was
6 worried about that confounding. She
7 left out the nonexposed.

8 BY MR. LASKER:

9 Q. My question to you is not whether
10 you believe that it existed or not but what
11 you can point to that you believe caused
12 this. I just want to make sure I
13 understand. You stated that you believe
14 confounding led to a bias in the reported
15 rate ratios away from the null; is that
16 correct? Is that your testimony?

17 MS. FORGIE: Objection --

18 THE WITNESS: That is one --

19 MS. FORGIE: Wait.

20 Objection. Asked and answered.

21 You can answer it again.

22 THE WITNESS: It is one of the
23 biases. Another one is random error.

24 BY MR. LASKER:

25 Q. Is it your testimony that random

1 error biased the rate ratio away from the
2 null?

3 A. Correct.

4 Q. How did that happen in your
5 opinion?

6 A. That is actually pointed out in the
7 beautiful paper by M. Jurek and Sander
8 Greenland that was in the list of your
9 experts, and that they obviously must have
10 misinterpreted.

11 Q. And the Sander Greenland article
12 talks about bias away from the null when
13 there is a bias that is associated both with
14 exposure and disease outcome; correct?

15 A. No. This is non-differential, and
16 they specifically called it
17 non-differential. Non-differential can
18 actually -- doesn't mean that it's just one
19 kind of bias that ends at 1, that it
20 actually -- because we are randomly sampling
21 from exposure distribution, we could
22 randomly also have estimates below the 1,
23 and that's what they're showing.

24 Q. In the Sander Greenland article
25 they state for that to happen, the

1 misclassification would have to be
2 associated both with the exposure and the
3 disease outcome; correct?

4 A. That's --

5 MS. FORGIE: Wait. Objection. I
6 think it would be fair to show her the
7 article. You're being very specific
8 here.

9 MR. LASKER: It's her testimony.

10 BY MR. LASKER:

11 Q. Is it your testimony that Sander
12 Greenland says there's exposure away from
13 the null when there is no association?

14 MS. FORGIE: Wait. Objection. I
15 still think you should show her the
16 article. I don't think it's fair.

17 THE WITNESS: The article I read
18 and I'm referring to was one on
19 non-differential exposure
20 misclassification, not differential.

21 BY MR. LASKER:

22 Q. Okay. And with respect to
23 non-differential exposure misclassification
24 for it to be a bias away from the null,
25 there would have to be an association both

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1 with exposure and with disease outcome;
 2 correct?
 3 MS. FORGIE: Object to the form.
 4 THE WITNESS: That is incorrect.
 5 That's the definition of differential
 6 exposure misclassification.
 7 BY MR. LASKER:
 8 Q. For a non differential exposure
 9 misclassification, you're not going to have
 10 bias away from the null; correct?
 11 MS. FORGIE: Object to the form.
 12 THE WITNESS: Incorrect. They are
 13 explicitly writing this article to show
 14 that under random error, strong random
 15 error in exposure misclassification
 16 that's non-differential, doesn't depend
 17 on disease, you can get a bias away from
 18 the null or across the null.
 19 BY MR. LASKER:
 20 Q. Let's take a look at your
 21 supplemental expert report at page 8.
 22 MS. FORGIE: It's number --
 23 MR. LASKER: 30-1.
 24 MS. FORGIE: 30-1. You're right.
 25 ///

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

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1 controls. This is by design in a cohorts
 2 since at the moment no one has a disease of
 3 interest such that remembering would be
 4 influenced by disease status."
 5 Did I read that correctly?
 6 A. That's correct.
 7 Q. And then page 6 of your expert
 8 report at the end of the carryover
 9 paragraph, the last sentence, and you've
 10 underlined this, you state, "The combined
 11 impact of these two sources of
 12 non-differential exposure misclassification
 13 can strongly bias results towards the null,
 14 i.e., not finding a true association."
 15 Correct?
 16 A. Where is that?
 17 Q. Page 6 underlined.
 18 A. Yeah, yeah.
 19 Q. In your supplemental expert report,
 20 and you've underlined this, you state "The
 21 combined impact of these two sources of
 22 non-differential exposure misclassification
 23 can strongly bias results towards the null,
 24 i.e., not finding a true association."
 25 Correct?

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1 A. Correct.
 2 Q. And in no place in your
 3 supplemental expert report do you ever state
 4 that there was any bias in the 2018 study
 5 that you state biased the reported rate
 6 ratios away from the null; correct?
 7 MS. FORGIE: Object to the form.
 8 THE WITNESS: I'm not sure what
 9 you're saying.
 10 BY MR. LASKER:
 11 Q. There is no statement anywhere in
 12 your supplemental expert report in which you
 13 state that the errors that you opine
 14 occurred in connection with the 2018 NCI
 15 study biased the results away from the null.
 16 MS. FORGIE: Object to the form.
 17 Mischaracterizes the report.
 18 You can answer.
 19 THE WITNESS: When you don't see a
 20 result, when you don't see a positive
 21 result for a risk factor, there's no
 22 reason to believe that it's biased away
 23 from the null. So there's no reason for
 24 me to comment on it.
 25 ///

1 BY MR. LASKER:

2 Q. Am I correct that there is no
3 statement anywhere in your supplemental
4 expert report in which you state that any of
5 the errors that you opined exist in the 2018
6 NCI study biased the results away from the
7 null?

8 MS. FORGIE: Object to the form.
9 Mischaracterizes the report.

10 THE WITNESS: This is not what I
11 was asked to do when I reviewed this
12 report. So there's no reason for me to
13 go into a bias that obviously doesn't
14 exist because there's no association
15 shown.

16 BY MR. LASKER:

17 Q. And there are numerous places in
18 this report that you talk about biases that
19 you believe exist in the 2018 NCI study that
20 you believe biased the results towards the
21 null; correct?

22 MS. FORGIE: Object to the form.
23 Mischaracterizes the report.

24 THE WITNESS: I was asked to
25 analyze the results with respect to

1 (Exhibit Number 30-15 was
2 marked for identification.)

3 MR. LASKER: 30-17?

4 MS. SHIMADA: 15.

5 MR. LASKER: 30-15. Thank you.

6 BY MR. LASKER:

7 Q. Dr. Ritz, you cite this 1997 memo
8 by Dr. Acquavella in your supplemental
9 expert report; correct?

10 A. Correct.

11 Q. And in particular at page 4 of your
12 expert report you quote from this report --
13 first of all, this report was drafted prior
14 to the time when the AHS study resulted in
15 any published epidemiological analyses of
16 pesticide exposure in cancer; correct?

17 MS. FORGIE: Object to the form.

18 THE WITNESS: When was it?

19 BY MR. LASKER:

20 Q. 1997.

21 A. They started publishing quite soon,
22 but I wouldn't be able to say whether it's
23 exactly before.

24 Q. Have you looked to see whether
25 there was any publication out of the AHS on

1 biases. That's what I did, and I gave
2 my opinion about what non-differential
3 exposure misclassification does in this
4 study, correct.

5 BY MR. LASKER:

6 Q. Okay. The --

7 A. Not what it does, in general. What
8 it does in this study.

9 Q. The 2011 -- let's mark this next in
10 line.

11 MS. FORGIE: Where are we in time
12 just out of curiosity, please.

13 THE VIDEOGRAPHER: 137.

14 MS. FORGIE: He's used up or
15 remaining.

16 BY MR. LASKER:

17 Q. Let's go to the 1997 Acquavella
18 memo.

19 MS. FORGIE: The memo?

20 MR. LASKER: This is something she
21 cites in her report.

22 THE WITNESS: Can I just get myself
23 a glass of --

24 MS. FORGIE: Hold on one second.

25 ///

1 pesticide exposure in cancer prior to this
2 memo?

3 A. I would imagine there isn't, but I
4 can't say for sure that there isn't.

5 Q. And you quote this memorandum on
6 page 4 of your supplemental expert report as
7 identifying two problems with the exposure
8 assessment in the AHS, and the first was
9 that usage does not necessarily mean
10 exposure (work practices, equipment,
11 environmental conditions, determine exposure
12 to a large degree); correct?

13 MS. FORGIE: What page are you on?

14 THE WITNESS: That's what it
15 states, yes.

16 BY MR. LASKER:

17 Q. That's what you quote in your
18 expert report on page 4; correct?

19 MS. FORGIE: Thank you.

20 THE WITNESS: Yes.

21 BY MR. LASKER:

22 Q. In the publications that came out
23 of the Agricultural Health Study including
24 the 2018 NCI study, they in their exposure
25 classification take into account intensity

<p style="text-align: right;">Page 106</p> <p>1 of exposure which includes variables on work 2 practices, equipment, and protective gear; 3 correct? 4 MS. FORGIE: Object to the form. 5 Mischaracterizes. 6 THE WITNESS: The AHS made an 7 attempt to take work practices and 8 protective equipment gear into 9 consideration. They went through -- to 10 a large extent through an exercise of 11 going out to farms and watching 20 to 30 12 farmers apply and take urine samples and 13 then, you know, estimated with what they 14 observed and what the urine samples 15 showed, which type of application method 16 and which type of protective equipment 17 would be giving you the most protection 18 so that you wouldn't find the 19 metabolites of certain pesticides in the 20 urine. 21 However, everything they did was 22 with 20 willing people who were being 23 observed and the algorithm they 24 developed was for 56,000 applicators who 25 reported use since 1974. Do we really</p>	<p style="text-align: right;">Page 108</p> <p>1 pesticides that were around for a long 2 time and were used changed, both changed 3 the most. There are other pesticides 4 that are kind of stable or discontinued 5 and whatever they reported at baseline 6 might be quite correct. 7 BY MR. LASKER: 8 Q. The other criticism that you quote 9 Dr. Acquavella making back in 1997 was that 10 recall can be faulty, and he talks about 11 attempts at verification of recall 12 information on pesticide exposure; correct? 13 MS. FORGIE: Object to the form. 14 THE WITNESS: He states that, yes. 15 BY MR. LASKER: 16 Q. Subsequent to the date of this 17 Acquavella memorandum, the AHS investigators 18 conducted a number of studies including 19 repeat questionnaires to assess the accuracy 20 of the recall information in the AHS 21 questionnaire for exposures to pesticides; 22 correct? 23 A. They attempted to do that, yes. 24 Q. Okay. The -- you have, in fact, in 25 your own research used intensity factors in</p>
<p style="text-align: right;">Page 107</p> <p>1 believe that what they are observing in 2 2003, let's say, reflects the intensity 3 and the type of application and the 4 protection, even the protective 5 equipment that would have been used by a 6 farmer in the '80s? 7 BY MR. LASKER: 8 Q. My question though -- I think 9 you've answered it -- is that this concern 10 that Dr. Acquavella raised in 1997, the AHS 11 investigators at least attempted to 12 address -- and I understand you have 13 concerns about how well they did that. Is 14 that fair? 15 MS. FORGIE: Objection. Asked and 16 answered as you just stated. 17 You can answer it again. 18 THE WITNESS: Well, the intensity 19 estimation that they conducted may work 20 in certain circumstances and may not 21 work in others, and we really don't know 22 in which they do and they don't. What 23 we know is the protective equipment 24 changed and that the application methods 25 changed and, therefore, for the</p>	<p style="text-align: right;">Page 109</p> <p>1 determining exposure -- exposures to 2 pesticides; correct? For epidemiological 3 research? 4 MS. FORGIE: Object to the form. 5 THE WITNESS: Actually we used 6 Dr. Dosemeci's scheme, and we also -- we 7 actually did three different types of 8 analyses where we used Dr. Dosemeci's 9 scheme, a scheme from someone else as 10 well as without weighing for intensity 11 at all, and interestingly, our own 12 results were stable and showed exactly 13 the same results for Parkinson's disease 14 whether or not we used intensity. 15 However, these -- that was a case 16 control study, and it's very different 17 in terms of exposure assessment from the 18 AHS. 19 BY MR. LASKER: 20 Q. Is -- and just to make sure we have 21 this correctly, this is Exhibit 30-16. 22 (Exhibit Number 30-16 was 23 marked for identification.) 24 BY MR. LASKER: 25 Q. This is the publication -- is that</p>

1 the publication you had in mind?
 2 A. Yes.
 3 Q. And in this publication when you
 4 presented -- in this presentation you used a
 5 measures of intensity and then as reported
 6 on page 247, you set forth your analyses of
 7 associations between Parkinson's disease and
 8 pesticide exposures based upon various
 9 exposure quartiles; correct?

10 MS. FORGIE: Object to the form.
 11 BY MR. LASKER:

12 Q. Tertiles.
 13 A. Yes.

14 MS. FORGIE: Give her a chance --
 15 BY MR. LASKER:

16 Q. What you set forth in your analysis
 17 was dosing based upon three exposure
 18 tertiles with odds ratios that were then
 19 compared to no exposure; correct?

20 MS. FORGIE: Object to the form and
 21 take your time to review it.

22 THE WITNESS: Yes, that's correct.
 23 BY MR. LASKER:

24 Q. In discussing your findings on
 25 page 244, and then it goes over to 246, on

1 believe that the epidemiologic -- strike
 2 that.

3 In your opinion, does the 2018 NCI
 4 study strengthen or weaken the
 5 epidemiological evidence in support of your
 6 opinion that there is an association between
 7 glyphosate-based herbicides and
 8 non-Hodgkin's lymphoma?

9 A. It does not change my opinion at
 10 all because it shows exactly what I
 11 predicted due to their severe exposure
 12 misclassification for glyphosate.

13 Q. Do you believe the 2018 NCI study
 14 has any weight in the evaluation of whether
 15 glyphosate-based herbicides caused
 16 non-Hodgkin's lymphoma?

17 A. It doesn't have it for me.

18 Q. At the end of your supplemental
 19 expert report you state that it would be
 20 inappropriate to include the 2018 NCI study
 21 in a meta analysis of glyphosate
 22 epidemiologic study; correct?

23 A. It depends on what you're trying to
 24 say. I learned that meta analyses -- and
 25 this is Dr. Greenland who wrote the bible in

1 page 244, among Parkinson's disease case
 2 control, and then continuing to 246,
 3 studies, a majority, however, relied on
 4 retrospectively self-reported occupational
 5 pesticide exposures solely based on expert
 6 assessment and job titles to construct
 7 exposure matrixes underscoring a lack of
 8 studies using exposure assessment methods
 9 that might not be affected by recall bias;
 10 correct?

11 A. Correct, in a case control study,
 12 yes.

13 Q. On page 248 in your study on the
 14 second column the second paragraph you
 15 state, "A limitation of our study we did not
 16 record usage of personal protective
 17 equipments with the occupational history
 18 which might modify pesticide exposure
 19 levels"; correct?

20 MS. FORGIE: Where is it?

21 THE WITNESS: Yes. Of this study.

22 MS. FORGIE: I see it. Thank you.

23 BY MR. LASKER:

24 Q. Dr. Ritz, if I understand -- let me
 25 make sure I understand correctly. Do you

1 epidemiology can be used in different ways,
 2 and the least informative way is to create a
 3 summary estimate across every study in the
 4 book because that just gives you a summary
 5 estimate that might be highly biased because
 6 studies are of very different quality.

7 So the way you should be using meta
 8 analysis is by grouping studies according to
 9 their design and their qualities in terms of
 10 exposure assessment, in terms of the
 11 possible selection bias, in terms of a lot
 12 of different bias-related issues and then
 13 use that to inform your opinion overall
 14 which type of study and which type of result
 15 you trust more.

16 Q. In your -- and maybe I
 17 misunderstood this. In your initial expert
 18 report in this litigation, you cited to a
 19 number of meta analyses that had been
 20 conducted prior to the 2018 NCI study and as
 21 you noted in your expert report, prior to
 22 the results for the NAPP which is the North
 23 American Pooled Project.

24 A. Right.

25 Q. Do you rely upon the summary

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1 findings in those meta analyses -- do you
 2 now rely upon the summary findings in those
 3 meta analyses as support for your opinion
 4 that there is an association between
 5 non-Hodgkin's lymphoma and glyphosate-based
 6 herbicides?
 7 MS. FORGIE: I'm going to object to
 8 the form. We're not here to talk about
 9 her original expert report. That's
 10 beyond the scope of this deposition.
 11 I'm going to let her answer this one.
 12 We're not going to go into her original
 13 expert report which you've already
 14 deposited her on for seven hours.
 15 THE WITNESS: As a scientist, I
 16 never rely on any summaries. I usually
 17 go to the original data and look at it
 18 and then actually try to judge each
 19 piece of work on its own merit.
 20 BY MR. LASKER:
 21 Q. Okay. Fair enough. Let's take a
 22 break and I'm going to review my notes.
 23 THE VIDEOGRAPHER: This marks the
 24 end of videotape number 1 in the
 25 deposition of Dr. Beate Ritz. We're off

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1 the record at 3:27 p.m.
 2 (Recess taken from 3:27 p.m. to
 3 3:59 p.m.)
 4 THE VIDEOGRAPHER: We are back on
 5 the record. This marks the beginning of
 6 videotaped number 2 in the deposition of
 7 Dr. Beate Ritz. You may proceed.
 8 MR. LASKER: Thank you.
 9 BY MR. LASKER:
 10 Q. Dr. Ritz, we were talking
 11 previously about non-differential exposure
 12 misclassification, and the investigators who
 13 worked on the AHS study in 2011 prepared an
 14 analysis of the impact of this type of
 15 non-differential exposure misclassification
 16 on estimates of relative risk in the AHS;
 17 correct?
 18 A. Let me see. They are specifically
 19 doing this for 2,4-D chlorpyrifos to
 20 evaluate their algorithm.
 21 Q. Right. But what the article is
 22 about is addressing the possibility of bias
 23 that can be created in their study through
 24 non-differential exposure misclassification;
 25 correct?

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1 MS. FORGIE: Object to the form.
 2 THE WITNESS: For two pesticides
 3 that are not glyphosate and did not have
 4 the same change as glyphosate has, yes.
 5 (Exhibit Number 30-17 was
 6 marked for identification.)
 7 BY MR. LASKER:
 8 Q. And then in -- on page -- you've
 9 seen this article before; correct?
 10 A. No.
 11 Q. Let's go back to your -- I'm sorry.
 12 Exhibit 30-1.
 13 In your reference list in your
 14 supplemental expert report you cite to this
 15 study; correct?
 16 A. That's the wrong one in here.
 17 MS. FORGIE: That may have been my
 18 fault. That was my fault. I'm sorry.
 19 BY MR. LASKER:
 20 Q. Which Blair publication -- we don't
 21 have to do this on the record. You can
 22 correct me.
 23 A. It's a different one. 2002-'05.
 24 Right?
 25 Q. We'll deal with this later. I

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1 understand now. Let me ask you with respect
 2 to what is the Exhibit Number 30- --
 3 A. 17.
 4 Q. On page 539 in the Blair 2011
 5 paper, the AHS investigators set forth --
 6 MS. FORGIE: What's the number on
 7 that one? I'm sorry. 30-17.
 8 MR. LASKER: 30-17.
 9 BY MR. LASKER:
 10 Q. The AHS investigators and Dr. Blair
 11 set forth various scenarios where
 12 non-differential misclassification could
 13 create bias in the reported rate ratios in
 14 epidemiological studies coming out of the
 15 AHS cohort; correct?
 16 A. That is incorrect. What they're
 17 doing here is actually comparing the
 18 algorithm of the AHS to urinary level active
 19 metabolize that they're measuring pre and
 20 post application, and that's a very
 21 different scenario from what actually the
 22 AHS did. They're estimating long-term
 23 exposure.
 24 Q. Let me walk you through on
 25 page 540. Let me take a step back. One of

<p style="text-align: right;">Page 118</p> <p>1 the issues that they're dealing with with 2 respect to correlation with urinary levels 3 is that could lead to exposure 4 misclassification in the AHS study. That's 5 one of the issues they're considering; 6 correct? 7 MS. FORGIE: Object to the form. 8 THE WITNESS: They are considering 9 whether the algorithm they are using for 10 application type and for protective 11 equipment used is actually accurately 12 reporting -- related, is accurately 13 related to metabolize their measuring 14 pre and post exposure because they're 15 using certain weights to define these 16 intensities. So they're observing 17 farmers while they are applying with 18 their usual methods, and they're 19 collecting the urine pre and post. They 20 also gave them a questionnaire at the 21 end of the day that asked them exactly 22 the same questions the AHS asked but for 23 a 24-hour period. And then they're 24 correlating, and that's all in the other 25 paper. Then they're correlating -- or</p>	<p style="text-align: right;">Page 120</p> <p>1 ratios in AHS studies towards the null; 2 correct? 3 MS. FORGIE: Object to the form. 4 THE WITNESS: It's the general -- 5 it's the general way that these 6 estimates might be biased, yes. 7 BY MR. LASKER: 8 Q. And if you can turn to page 540 -- 9 A. And that's their own conclusion 10 here. 11 Q. Right. I understand. I just read 12 it. 13 A. Yeah, exactly. 14 Q. If you can turn to page 540 of 15 Dr. Blair's 2011 article, and on the second 16 column he discusses several conclusions can 17 be drawn from evaluation of the impact of 18 exposure misclassification on an estimated 19 relative risks in the agricultural health 20 study. Do you see that in the second 21 column at the top? 22 A. Several conclusions, yes. 23 Q. The first that they state is -- 24 A. I need my glasses. 25 Q. That's fine.</p>
<p style="text-align: right;">Page 119</p> <p>1 in the Coble Bay paper, in a number of 2 papers. And then they are correlating 3 what they see in the urinary levels to 4 the estimated effect for 24 hours. So 5 all they're evaluating here is a 6 24 hour -- or validating is a 24-hour 7 correlation between a urinary metabolite 8 and an application method and personal 9 protective equipment use. 10 BY MR. LASKER: 11 Q. Can I take to you the abstract of 12 this publication on the first page. In the 13 conclusions here in the abstract it states 14 "Although correlations between algorithm 15 scores and urinary levels were quite good, 16 i.e., correlations between 0.4 and 0.8, 17 exposure misclassification with still bias 18 relative risk estimates in the AHS toward 19 the null and diminished study power." 20 Do you see that? 21 A. Yes, I see that. 22 Q. So that is the issue of as you talk 23 about in your expert report the possibility 24 of a non-differential exposure 25 misclassification biasing reported rate</p>	<p style="text-align: right;">Page 121</p> <p>1 "First, the correlation between 2 questionnaire or observer information on 3 pesticide use in measured urinary levels are 4 in the range found for other factors that 5 are usually considered to be reliably 6 obtained for epidemiologic studies such as 7 tobacco and alcohol use, diet, physical 8 activity and health assessments"; correct? 9 A. Yes, but that refers to a 24-hour 10 period. It doesn't refer to any long-term 11 40, 30-year period. 12 Q. Right. And you are also aware 13 through the Blair 2002 study which is a 14 different analysis when they looked at 15 questionnaire responses taken a year apart, 16 the same person filled out a questionnaire 17 and then a year later filled out a 18 questionnaire response, they similarly found 19 that the information that they were 20 obtaining on pesticide exposure -- the 21 consistency was similar to what they were 22 finding for these other factors such as 23 tobacco and alcohol use; correct? 24 MS. FORGIE: Object to the form. 25 Also I think it would only be fair to</p>

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1 let her see the 2002 article.
 2 THE WITNESS: It's actually quite
 3 different what I remember. What I
 4 remember is that they had a general good
 5 agreement for yes/no which was
 6 83 percent. However, when they went and
 7 asked about duration and intensity, the
 8 agreement was 53 percent for glyphosate,
 9 meaning 47 percent got it wrong. In one
 10 year. In one year. So we don't even
 11 talk about 30 years.
 12 BY MR. LASKER:
 13 Q. And we can go back to the 2002
 14 study if we have time, but in your
 15 understanding of what it meant to get it
 16 wrong, do you recall again what the
 17 investigators reported as far as how far off
 18 those individuals were with respect to the
 19 year of exposure or the duration of exposure
 20 as reported in that paper?
 21 A. That is not that paper. That was,
 22 I think, a Jane Hoppin paper where they
 23 looked at the first use and the duration.
 24 Jane is a very good friend, and that's not
 25 her best paper because all this paper says

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

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

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1 would do; right?
 2 MS. FORGIE: Object to the form.
 3 Are you reading from it?
 4 THE WITNESS: It's depending on
 5 which correlation size they have, yes.
 6 BY MR. LASKER:
 7 Q. And then if you go down further on
 8 the page, further in that column, for
 9 example, if the correlation between
 10 algorithm exposure intensity scores and
 11 measured urinary levels was 0.4 and the true
 12 relative risk was 3.0, the observed relative
 13 risk would be between 1.3 and 1.9 when
 14 sensitivity is in the 60 to 80 percent
 15 range. Do you see that?
 16 MS. FORGIE: Where are you reading
 17 from?
 18 THE WITNESS: Yeah, that's what
 19 they say.
 20 BY MR. LASKER:
 21 Q. If you can turn back now to
 22 page 539 --
 23 MS. FORGIE: Hold on one second.
 24 MR. LASKER: Page 540.
 25 ///

1 BY MR. LASKER:

2 Q. Turn back to page 539, the chart
3 you're looking at previously, the first
4 row of those charts is showing if the true
5 relative risk was 3.0, and they are
6 providing various calculations of the degree
7 to which that true rate ratio of 3.0 could
8 be biased towards the null under various
9 scenarios of sensitivity and specificity and
10 correlation; correct?

11 A. Right.

12 MS. FORGIE: Object to the form.

13 BY MR. LASKER:

14 Q. So then if we can turn back now to
15 page 540 and follow along that same place
16 that we were looking at --

17 A. Yes.

18 Q. -- they state for a true relative
19 risk of 2.0, the observed relative risks
20 from correlations of 0.2 or 0.4 never rise
21 above 1.4; correct?

22 A. That's what it says.

23 Q. And then if you go back then to
24 page 539, this is the second row of these
25 tables looking at a true rate ratio of 2.0

1 that is the third row of the charts that are
2 presented on that page; correct?

3 A. Yes.

4 Q. And depending on the degree of
5 correlation, depending on the specificity
6 and depending on the sensitivity of their
7 exposure measures, there is different levels
8 of bias towards the null that can occur from
9 this type of non-differential exposure
10 misclassification; correct?

11 A. I don't see specificity. There's
12 only sensitivity.

13 Q. Okay. With the three -- okay.
14 Let's say, I'm sorry, correlation, and
15 sensitivity. You're right. Not
16 specificity.

17 A. Right.

18 Q. But the three different charts --
19 PX equals 0.7, PX equals 0.4, PX equals 0.2,
20 those different columns would then be --

21 A. Different exposure --

22 MS. FORGIE: Wait, wait.

23 THE WITNESS: Prevalences.

24 BY MR. LASKER:

25 Q. Different exposure prevalences,

1 and the possible impacts of a
2 non-differential misclassification biasing
3 those results towards the null for a whole
4 host of different possible specificities and
5 sensitivities and correlation levels;
6 correct?

7 A. Not a whole host.

8 MS. FORGIE: Object to the form.

9 BY MR. LASKER:

10 Q. So they have correlations of either
11 0.2, 0.4, or 0.7?

12 A. Right.

13 Q. They have sensitivities going from
14 0.5 to 1.0, and they have specificity of
15 either -- of three various -- of three
16 levels; correct?

17 A. Correct.

18 Q. And then finally if you can return
19 to page 540, they state from -- for true
20 relative risks of 0.5, correlations from 0.2
21 to 0.4 between exposure estimates and
22 measurements yield estimates of relative
23 risk between 0.7 and 0.9; correct?

24 A. That's correct.

25 Q. If you go back to page 539, and

1 thank you.

2 Depending on these various
3 different possibilities, there's various
4 degrees of non-differential exposure
5 misclassification that can result in various
6 degrees of biasing towards the null;
7 correct?

8 A. Yes.

9 Q. In none of the scenarios that they
10 examined in this paper for the AHS for
11 non-differential exposure misclassification
12 did they find any situation in which the
13 bias would be past the null --

14 A. Okay.

15 Q. -- in the other direction?

16 A. Correct. Because they don't assess
17 random error in doing these, and they do
18 not -- they assume that there's no other
19 bias.

20 Q. For the AHS investigators in their
21 published publication when they looked at
22 non-differential misclassification and they
23 reported their findings, they did not report
24 any findings which would lead to what you
25 believe happened in the 2018 NCI study; is

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

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1 MS. FORGIE: With the what?
 2 MR. LASKER: The random error in
 3 which you have confidence intervals
 4 which you believe would cross over the 1
 5 you testified --
 6 THE WITNESS: No, no.
 7 MS. FORGIE: Wait for the question.
 8 Sorry.
 9 BY MR. LASKER:
 10 Q. If I understand correctly then, the
 11 point estimate would not cross over the 1,
 12 but there would be the possibility of error
 13 that could go below -- that could cross over
 14 the 1. Is that your testimony?
 15 MS. FORGIE: Object to the form.
 16 THE WITNESS: No, that's incorrect.
 17 We are pretending that any study that we
 18 are having like the AHS is just -- is
 19 getting -- okay. It is actually what
 20 Jurek and Greenland tried to describe.
 21 We are pretending that a study estimates
 22 without random error. Once we put
 23 random error in then whatever the point
 24 estimate in the -- within the confidence
 25 interval is under multiple repetitions

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1 can very well lend under 1.
 2 BY MR. LASKER:
 3 Q. And if I understand correctly --
 4 A. So it's not just the confidence
 5 level.
 6 Q. If I understand correctly then, the
 7 general expectation is that it would bias
 8 towards the null, but there is still the
 9 possibility through random error that it
 10 might not. Is that fair?
 11 MR. BAUM: Object to the form.
 12 THE WITNESS: Random error in
 13 one -- of exposure misclassification may
 14 make a point estimate in a study land on
 15 the opposite side of the 1, yes.
 16 BY MR. LASKER:
 17 Q. The general expectation would be if
 18 you repeat these studies over and over
 19 again, most of the time you're not going to
 20 have that, but with random error sometimes
 21 you might?
 22 MS. FORGIE: Object to the form.
 23 THE WITNESS: That's what the paper
 24 says, yes.
 25 ///

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1 BY MR. LASKER:
 2 Q. Okay. Let's look at Gray 2000.
 3 (Exhibit Number 30-18 was
 4 marked for identification.)
 5 BY MR. LASKER:
 6 Q. What is this marked?
 7 MS. SHIMADA: 18.
 8 BY MR. LASKER:
 9 Q. This is a paper that I believe this
 10 one you have seen; correct?
 11 A. Yes, yes.
 12 Q. You cited this one in your paper?
 13 A. Yes.
 14 Q. And this is one of the publications
 15 you cite to -- --
 16 MS. FORGIE: Wait. Did you give me
 17 a copy of it?
 18 MR. LASKER: I believe so.
 19 BY MR. LASKER:
 20 Q. This is one of the publications
 21 that you cited to that had -- for criticisms
 22 of the AHS; correct?
 23 A. Yes.
 24 Q. Okay. This paper was written in
 25 2000; correct?

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1 MS. FORGIE: Object to the form.
 2 THE WITNESS: Yes, it was published
 3 in 2000.
 4 BY MR. LASKER:
 5 Q. Published in 2000. We can reaffirm
 6 this. I've gone through the agricultural
 7 health study publication list, but are you
 8 aware of any publication out of the AHS
 9 cohort that provided findings for an
 10 epidemiologic study for exposure between any
 11 pesticide and a cancer outcome that was
 12 published prior to this Gray paper?
 13 MS. FORGIE: Object to the form.
 14 THE WITNESS: I'm not certain.
 15 BY MR. LASKER:
 16 Q. Okay. Now, the Gray 2000 paper is
 17 discussing a wide variety of different types
 18 of epidemiologic studies that were
 19 anticipated in the future using AHS data
 20 including both cohort studies, case control
 21 studies, and cross-sectional studies.
 22 A. Yes.
 23 Q. And various different types of
 24 cancer and non-cancer outcomes; correct?
 25 A. That's correct.

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

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1 again?
 2 MR. LASKER: First page of the
 3 paper, page 47. The abstract.
 4 MS. FORGIE: Thank you.
 5 BY MR. LASKER:
 6 Q. In the first paragraph the end of
 7 the paragraph they state, "In this report,
 8 we examine the design of the AHS, identify
 9 important program strengths and flaws,
 10 suggest various improvements in the program,
 11 and recommend ancillary studies that could
 12 be undertaken to strengthen the AHS";
 13 correct?
 14 A. Yes.
 15 Q. And then on page 67 they start
 16 going through their recommendations, summary
 17 of research recommendations for the AHS;
 18 correct?
 19 A. Yes.
 20 Q. The first recommendation that Gray
 21 and his co-authors provide deals with
 22 assessing the validity of self-reported
 23 health outcomes; correct?
 24 A. Yes.
 25 Q. And for the 2018 NCI study, they're

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1 not using self-reported health outcomes.
 2 They're using cancer data from registries;
 3 correct?
 4 A. Yes, for cancer it's always
 5 registries.
 6 Q. So we can agree that this
 7 recommendation is not relevant to the 2018
 8 NCI study; correct?
 9 MS. FORGIE: Object to the form.
 10 THE WITNESS: For the health
 11 outcome cancer, it's not.
 12 BY MR. LASKER:
 13 Q. So the second recommendation is --
 14 deals with exploring the reliability and
 15 validity of pesticide use data; correct?
 16 A. Yes.
 17 Q. And in the second sentence in that
 18 recommendation, one of the things they
 19 recommend, a simple and pertinent step would
 20 be to re-administer the questionnaire to a
 21 sample of respondents to see how much the
 22 answers change; correct?
 23 A. That's what it says.
 24 Q. We already talked about this and
 25 now we will have a chance to look at it, the

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1 NAH investigators who were doing the AHS
 2 study, in fact, did that analysis in a
 3 publication by Blair in 2002; correct?
 4 MS. FORGIE: Object to the form.
 5 THE WITNESS: There is a Blair 2002
 6 paper that I read that reports on
 7 readministered questionnaires, that's
 8 correct.
 9 BY MR. LASKER:
 10 Q. So let's mark that.
 11 (Exhibit Number 30-19 was
 12 marked for identification.)
 13 BY MR. LASKER:
 14 Q. For the record Blair 2002,
 15 "Reliability of Reporting on Lifestyle and
 16 Agricultural Factors by a Sample of
 17 Participants in the Agricultural Health
 18 Study from Iowa"; correct?
 19 A. That's correct.
 20 Q. And in the abstract of this
 21 publication, Dr. Blair and his
 22 co-investigators write, and it's the last
 23 sentence of the abstract, "Levels of
 24 agreement regarding pesticide use in this
 25 population is similar to that generally

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1 found for factors typically used in
 2 epidemiologic studies such as tobacco use
 3 and higher than typically reported for diet,
 4 physical activity, and medical conditions";
 5 correct?
 6 A. That's correct.
 7 Q. And if you turn to page 96, this is
 8 where you were discussing the issue of --
 9 well, first of all, on page 95, Table 1,
 10 this is the reliability or the
 11 correspondence for glyphosate which I think
 12 you actually gave an extra point. It was
 13 82 percent agreement from one questionnaire
 14 to the other for never ever use; correct?
 15 A. Yes, but the Kappa is .54.
 16 Q. And then on Table 2, I believe
 17 you're talking about the issue of
 18 correlations for years mixed -- days per
 19 year mixed and decades first applied;
 20 correct?
 21 MS. FORGIE: Object to the form.
 22 THE WITNESS: Years mixed and
 23 applied, days, years, mixed and decade
 24 first applied, yes.
 25 ///

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1 BY MR. LASKER:
 2 Q. And in the text underneath that
 3 Table 2 --
 4 A. Oh, one thing. These are not
 5 correlations. These are exact agreements
 6 and proper statistics. Not correlation.
 7 Q. Exact agreements. That gets to the
 8 next point I was trying to make which we
 9 were talking about earlier. Under this
 10 Table 2 they talk about exact agreements and
 11 the various numbers that they get and they
 12 note, for example, "In addition, exact
 13 agreement for years, days per year, and
 14 decades of use of specific pesticides was
 15 generally in the 50 to 70 percent range
 16 which was lower than for dichotomous
 17 outcomes such as ever/never use"; correct?
 18 A. I can't see it.
 19 MS. FORGIE: Take your time.
 20 BY MR. LASKER:
 21 Q. Table 2, there is the text "exact
 22 agreement."
 23 Do you see that?
 24 A. Yes.
 25 Q. If you read down the second

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1 sentence or third sentence "In addition" --
 2 A. Yeah, yeah.
 3 Q. Okay. "Exact agreement for years,
 4 days per year, and decades of use of
 5 specific pesticides was generally in the 50
 6 to 70 percent range which was lower than for
 7 dichotomous outcomes such as ever/never
 8 use," and that's what you were discussing
 9 earlier; correct?
 10 A. Correct.
 11 Q. Then they state 90 percent of the
 12 subjects gave responses within one category
 13 of agreement on the two questionnaires;
 14 correct?
 15 A. Yes.
 16 Q. So while there was 50 to 70 percent
 17 exact agreement, where there was not exact
 18 agreement, 90 percent of them or overall
 19 90 percent of them were still within one
 20 category of agreement; correct?
 21 MS. FORGIE: Wait. Object to the
 22 form.
 23 THE WITNESS: That is correct.
 24 However, these categories are quite
 25 broad. So the -- this agreement can be

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1 quite -- I mean, they can guess quite a
 2 bit.
 3 BY MR. LASKER:
 4 Q. Do you know what the categories
 5 are?
 6 A. Yes. They are one year, five to
 7 ten -- four to five years, five to ten
 8 years, and then ten to twenty. So depending
 9 on what we're talking about, if it's years
 10 mixed and applied, et cetera.
 11 Q. And days per year, do you know what
 12 those categories are?
 13 A. Decades, days per year -- the
 14 decades were really decades. So --
 15 Q. And days per year? Do you remember
 16 the categories?
 17 MS. FORGIE: Hold on. Give her a
 18 second.
 19 THE WITNESS: It was something like
 20 one to ten, and then there was I think
 21 the highest category was 50 plus.
 22 MS. FORGIE: Take your time. Don't
 23 feel rushed.
 24 BY MR. LASKER:
 25 Q. With respect to the exact agreement

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

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

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1 went back as far as '74, and we agreed
 2 before that practices change. So
 3 whatever that biomonitoring shows may or
 4 may not represent what changed.
 5 BY MR. LASKER:
 6 Q. I understand. But Gray, et al., in
 7 the 2000 paper were recommending that the
 8 investigators who were conducting research
 9 with the AHS study conduct biomonitoring
 10 studies and the investigators in the AHS
 11 then followed up and conducted biomonitoring
 12 studies; correct?
 13 MS. FORGIE: Objection. Asked and
 14 answered.
 15 You can answer it again.
 16 THE WITNESS: I'm not certain that
 17 they're following these recommendations.
 18 They may have decided on their own that
 19 they needed biomonitoring studies.
 20 BY MR. LASKER:
 21 Q. That's fair. That's fair.
 22 The next recommendation that the
 23 Gray investigators have in their 2000 paper
 24 is assessing the biological plausibility of
 25 any association; correct?

1 A. Yes.
 2 Q. And while we may disagree with what
 3 the assessment is of biological plausibility
 4 in this case, it is fair to say that by the
 5 time of the 2018 NCI study, there are
 6 extensive studies by which one could address
 7 the issue of biological plausibility between
 8 glyphosate-based herbicides and
 9 non-Hodgkin's lymphoma; correct?
 10 MS. FORGIE: I'm sorry. I just see
 11 these hands in the air. What are the
 12 fingers?
 13 MR. LASKER: Eight minutes left, I
 14 think.
 15 THE WITNESS: Now I'm confused.
 16 Say it again.
 17 BY MR. LASKER:
 18 Q. By the time of the 2018 NCI study
 19 was conducted, there was a body of
 20 scientific evidence --
 21 A. It's not an NCI study. It's the
 22 AHS study published in the Journal of NCI.
 23 Q. At the time of the study in the
 24 Journal of NCI was published in 2018 on
 25 glyphosate-based herbicides and cancer

1 here would be typical of a major
 2 investigation, investigator initiated
 3 proposal that is peer-reviewed and judged to
 4 be worthy of funding by the National
 5 Institutes of Health"; correct?
 6 A. That's what it says.
 7 Q. In the 18 years that have followed
 8 the Gray paper, the AHS investigators have
 9 published over a hundred -- maybe over 200
 10 different peer-reviewed publications coming
 11 out of that cohort; correct?
 12 MS. FORGIE: Object to the form.
 13 THE WITNESS: They have published a
 14 lot.
 15 BY MR. LASKER:
 16 Q. And they have continued to go back
 17 to NAH to receive additional funding;
 18 correct?
 19 MS. FORGIE: Object to the form.
 20 THE WITNESS: They actually had a
 21 lot of difficulty getting funding.
 22 BY MR. LASKER:
 23 Q. They have continued to receive
 24 continued funding from NAH; correct?
 25 MS. FORGIE: Object to the form.

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

1 Asked and answered.
 2 You can answer it again.
 3 THE WITNESS: There are different
 4 ways of getting funding. One is
 5 internal funding and one is external
 6 funding. The internal funding is not
 7 reviewed in the same way as external
 8 funding. For the maintenance of the
 9 cohort, they got internal funding that
 10 is not as peer-reviewed as any study
 11 that would be external.
 12 BY MR. LASKER:
 13 Q. Okay. And as we discussed in
 14 our -- over the course of the deposition
 15 here today, the AHS investigators also did a
 16 variety of different -- conducted a variety
 17 of different analyses in separate studies to
 18 look at possibilities of exposure
 19 misclassification. They did biomonitoring
 20 studies and within the 2018 NCI studies,
 21 they conducted a variety of sensitivity
 22 analyses; correct?
 23 MS. FORGIE: Object to the form.
 24 THE WITNESS: They have attempted
 25 as much as they could to wrap their mind

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1 around potential exposure
 2 misclassification. It doesn't mean that
 3 they succeeded and it didn't mean they
 4 succeeded for every pesticide.
 5 MR. LASKER: Take a break. I've
 6 got three minutes left. I'm going to
 7 see if I've got three minutes of
 8 questions.
 9 THE VIDEOGRAPHER: We are off the
 10 record at 4:35 p.m.
 11 (Recess taken from 4:35 p.m. to
 12 4:48 p.m.)
 13 THE VIDEOGRAPHER: We are back on
 14 the record at 4:48 p.m.
 15 MR. LASKER: I'm going to reserve
 16 my remaining 3 minutes and 30 seconds.
 17 I have no further questions unless
 18 there's questions from plaintiff's
 19 counsel.
 20 MS. FORGIE: Okay. Let's take a
 21 break. I didn't know. I thought you
 22 were going to --
 23 THE VIDEOGRAPHER: We're off the
 24 record at 4:48 p.m.
 25 (Recess taken from 4:48 p.m. to

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1 5:31 p.m.)
 2 THE VIDEOGRAPHER: We are back on
 3 the record at 5:31 p.m.
 4 MS. FORGIE: Counsel said he has a
 5 statement to make.
 6 MR. LASKER: Yes. By my count,
 7 counsel has been off with the expert
 8 witness for 42 minutes since the close
 9 of my questioning, and that's on top of
 10 another 13-minute period of time they
 11 spent when I took the break with only a
 12 couple minutes left in my deposition
 13 time. Certainly both parties have
 14 extended the other side reasonable time
 15 to sort of gather their notes and
 16 prepare for whatever additional
 17 questioning they have, but this is
 18 excessive and we object to the amount of
 19 time that's been spent in that effort.
 20 So, again, noting for the record the
 21 amount of time spent and our objection
 22 to the line of questioning given this
 23 amount of preparation that's obviously
 24 been put into it, I will now tender the
 25 witness.

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1 MS. FORGIE: Well, I completely
 2 disagree with the way that the break
 3 time was interpreted in your statement
 4 because when we took the break, I
 5 thought you were going to come back and
 6 ask more questions. That was the
 7 implication. So we took a break for you
 8 to gather your thoughts and use the
 9 last -- what I thought was using the
 10 last of your three-and-a-half minutes,
 11 and instead when we came back you said
 12 I'm going to reserve those
 13 three-and-a-half minutes at which point
 14 we took a break to prepare.
 15 MR. LASKER: I understand. And
 16 that subsequent break was 42 minutes.
 17 Go ahead.
 18 MS. FORGIE: Whatever.
 19
 20 EXAMINATION
 21 BY MS. FORGIE:
 22 Q. Doctor, you were asked a series of
 23 questions about whether the same imputation
 24 method was used for other AHS publications
 25 that were peer-reviewed. Do you remember

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1 those series of questions?
 2 A. Yes, I do.
 3 Q. Does the use of imputation in these
 4 studies make the use of imputation for
 5 glyphosate more reliable?
 6 A. Absolutely not.
 7 Q. Can you explain why not?
 8 A. You can use the same method, but
 9 you're trying to impute a different type of
 10 exposure, and it really depends on the type
 11 of exposure that you're trying to impute
 12 whether the mechanism will work. So a
 13 generic imputation mechanism should be
 14 considered valid within the confines of what
 15 you're trying to predict. So that
 16 imputation mechanism may work very well when
 17 there is non-time varying exposure, and you
 18 have a lot of variables that can predict
 19 this exposure, but it doesn't work if
 20 there's a lot of change in time varying
 21 exposure, and you have too long of a
 22 distance between the times that you're
 23 asking the questions and when you're asking
 24 the question, you're not asking the right
 25 questions.

1 Q. Okay. Do you recall the Bonner
2 study that we discussed earlier?

3 A. Yes.

4 Q. Can you pull out, I believe it's
5 30-8, please.

6 A. Yes, here it is.

7 Q. Can you please turn to page 5?

8 MR. LASKER: I've got it. Page 5
9 makes no sense because there's 500.

10 MS. FORGIE: I stopped mid sentence
11 to see if you have. It's page 546.

12 MR. LASKER: I have it.

13 BY MS. FORGIE:

14 Q. Page 546. Can you look at in the
15 first column the second full
16 paragraph starting out with "We used."

17 A. Right.

18 Q. Can you read that, please, into the
19 record?

20 A. "We used PROC MIANALYZE (SAS 9.3)
21 to confirm multiple imputation approach.
22 For the pesticides dieldrin, 2,4, 5-TP,
23 parathion, chlordane, DDT, heptachlor and
24 toxaphene, there was no variability between
25 the five imputed sets because the

1 A. Yes.

2 Q. Okay. Let me attach -- do you know
3 what's next?

4 (Discussion off the record.)

5 MS. FORGIE: I'm going to mark your
6 original report as 30-20.

7 MR. LASKER: Objection to the
8 extent that we weren't supposed to talk
9 about her original report. That was
10 your objection, but that's fine.

11 MS. FORGIE: Right. I think I can
12 tie it in.

13 MR. LASKER: Okay. Things have
14 been changing all over the place here.
15 (Exhibit Number 30-20 was
16 marked for identification.)

17 MS. FORGIE: I lost my train of
18 thought.

19 THE WITNESS: Non-differential.

20 BY MS. FORGIE:

21 Q. Right. Is that in your original
22 report which is Exhibit 30-20?

23 A. Yes.

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

1 registration had been canceled before the
2 phase 2 interviews were conducted."

3 Q. Do you attach any significance to
4 that paragraph or that sentence?

5 A. Yes, that is exactly the kind of
6 sentence that states in writing by the AHS
7 investigators what I tried to explain here
8 to counsel when I said it makes a very big
9 difference in the imputation results whether
10 you have time varying versus non-time
11 varying exposures and that it's especially
12 easy to get good, reliable imputations when
13 exposure has pretty much stopped, and that
14 is especially hard when exposure continues.
15 It not only continues but changes heavily.

16 Q. Anything else?

17 A. That's it.

18 Q. Okay. You were also asked several
19 questions about whether or not
20 non-differential exposure misclassification
21 and also about bias away from the null. Do
22 you remember those questions?

23 A. Yes.

24 Q. You were asked if those opinions
25 were in your report. Do you remember that?

1 BY MS. FORGIE:

2 Q. What page is that on?

3 A. I talk about information bias and
4 mismeasurement of exposure on page 8.

5 Q. So those opinions are included in
6 your report; correct?

7 A. Correct.

8 MR. LASKER: Objection to form.

9 BY MS. FORGIE:

10 Q. Do agree that AHS participants
11 would be less likely to use protective
12 equipment when applying glyphosate compared
13 to when they apply other pesticides that are
14 perceived as acutely dangerous?

15 MR. LASKER: Objection to form.
16 Calls for speculation.

17 THE WITNESS: As somebody who has
18 done pesticide studies and knows how
19 people act and report, I would think
20 that, yes, they would report their
21 behavior differently, and they would
22 also use different protective equipment
23 depending on how dangerous they consider
24 the task that they're doing is.

25 ///

1 BY MS. FORGIE:

2 Q. Can you explain what you mean by --
3 what is the difference in pesticides in
4 terms of acute danger?

5 A. Right. So there are herbicides,
6 and there are pesticides that are called
7 insecticides, and there's specifically a
8 class of insecticides that are called
9 organophosphates that are derived from
10 serine gas which is a neurotoxin as we know.
11 And these kind of pesticides generate acute
12 effects so that the farmers would actually
13 who are susceptible to these kind of OP
14 pesticides and use them and get exposed and
15 we know because they are because
16 chlorpyrifos is one of them and we measure
17 that in the urine. That's in one of the
18 papers. They actually have acute sensations
19 that are very unpleasant, and they would
20 definitely want to avoid those. They're
21 flu-like systems. They're developing over a
22 few days.

23 Q. Can they also get rashes?

24 A. They could get rashes. There are
25 lots of acute effects. If you have had them

1 protective equipment used to generate a
2 generic algorithm, and it's a generic
3 algorithm in which the number of days,
4 frequency of use per year, and the duration
5 of use gets down weighted if you say that
6 you're wearing -- that you're using
7 protective equipment or that you're applying
8 in a certain way that we know like using a
9 closed cab of a tractor that we know reduces
10 exposure. So somebody that would have used
11 glyphosate for ten years and reports using a
12 enclosed cab or a chemically-resistant glove
13 would then get a .2 weight, let's say, for
14 example, and from 10 your numbers would be
15 reduced to 2. That would happen for every
16 pesticide in the same way whether or not you
17 use the resistant gloves only for the OPs or
18 also for glyphosate. And we know that all
19 of these farmers applied multiple
20 pesticides, and we have no idea for which
21 pesticide they reported protective equipment
22 used or for which pesticide they reported
23 what application method.

24 Q. Okay. You were also asked a
25 question about what weight you would give

1 once or twice, you learned your lesson.

2 Q. How does that affect whether or not
3 you're going to use protective equipment?

4 A. I would think that a farmer who has
5 these acute sensations would actually make
6 sure that he doesn't spill those pesticides
7 and wears chemically-resistant clothes,
8 gloves, and follows the instructions on the
9 labels for the pesticides and his education
10 on how to handle pesticides much more
11 closely than if you have no acute effect at
12 all from handling pesticides.

13 Q. Okay. So in the AHS study, did
14 they distinguish between whether or not you
15 were using protective gear for a specific
16 pesticide, or was it more general?

17 A. It was completely general. It's
18 one question that refers to a -- when you
19 handle pesticides, what do you do, how do
20 you apply them and what kind of protective
21 equipment do you use.

22 Q. How would that affect, for example,
23 intensity weighting in the AHS study?

24 A. Well, they're using these two
25 questions, the type of application and the

1 the AHS study, the 2018 AHS publication with
2 regard to your opinions in this case. Do
3 you remember that question?

4 A. Yes.

5 Q. Can you clarify or expand upon what
6 weight exactly you would give the 2018 AHS
7 study?

8 MR. LASKER: Objection to form.

9 THE WITNESS: It definitely has to
10 be reviewed, and it definitely needs to
11 be considered. However, as I tried to
12 explain, there is some weight to every
13 study. Some studies have a larger
14 weight than others. The way I determine
15 that is by looking at the potential
16 biases that these studies may have as
17 well as the size of the study and
18 sensitivity analyses that do help me or
19 don't help me to determine whether these
20 biases have been taken care of, and
21 overall, I feel these sensitivity
22 analyses done in this 2018
23 publication -- let's call it 2018 -- all
24 make a lot of assumptions under which
25 that I wouldn't agree with. Each of the

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1 sensitivity analyses makes another
 2 assumption that would only give you a
 3 piece of the puzzle. It never considers
 4 the whole realm of biases that you have
 5 to actually consider.
 6 BY MS. FORGIE:
 7 Q. And does that fit in any way into
 8 the way you look at -- and I never say this
 9 right but heterogeneity?
 10 MR. LASKER: Object to form.
 11 THE WITNESS: So what we usually
 12 do, we try to do is learn from
 13 differences in estimates between
 14 studies, and the way we do that is by
 15 exploring studies by design and by
 16 method in terms of what they're telling
 17 us about what the possible biases and
 18 what the possible flaws and the possible
 19 strengths of each of these study types
 20 are, and that's what I've been doing.
 21 BY MS. FORGIE:
 22 Q. Is there anything in the 2018 AHS
 23 publication that changes any of your
 24 opinions in your original expert report?
 25 A. No.

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1 Q. Is there anything in the 2018 AHS
 2 publication that changes any of your
 3 opinions as expressed in your rebuttal
 4 report?
 5 A. No.
 6 Q. Is there anything in the 2018 AHS
 7 publication that changes any of your
 8 opinions as expressed in your deposition?
 9 A. No.
 10 Q. You were asked several questions
 11 about relative risks in the 2018 AHS study.
 12 Do you remember those questions?
 13 A. Yes.
 14 Q. Are there any relative risks -- and
 15 you can turn to the study which is -- I
 16 can't remember the number, but we'll find
 17 out.
 18 MR. LASKER: 30-11.
 19 THE WITNESS: Yeah.
 20 BY MS. FORGIE:
 21 Q. Okay. In 30-11 in the actual
 22 publication, are there any relative risks in
 23 there that are actually above 1?
 24 A. Yes, there are plenty.
 25 Q. Can you point just a few of those

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1 out, please.
 2 MR. LASKER: Objection to form.
 3 Are you limiting this to the NHL or
 4 are we talking about all the other
 5 cancers as well?
 6 MS. FORGIE: We're talking about
 7 NHL.
 8 MR. LASKER: NHL or subtypes.
 9 Okay.
 10 MS. FORGIE: It's the same.
 11 THE WITNESS: So it's actually
 12 interesting that most of the relative
 13 risks above 1 start to appear when
 14 you're doing a 20-year lag. So you have
 15 the 1.17, 1.15. You even have a 2.97
 16 for non-Hodgkin's lymphoma T cells.
 17 MR. LASKER: Objection to form.
 18 BY MS. FORGIE:
 19 Q. Why do you think it's interesting
 20 that those relative risks above 1 appear in
 21 the 20-year lag period?
 22 MR. LASKER: Objection to form.
 23 Beyond the scope.
 24 THE WITNESS: Because that lag
 25 period excludes the major period of

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1 change of glyphosate, and that's where
 2 all of or a lot of the exposure
 3 assessment misclassification happened.
 4 So once we get rid of that period but we
 5 make another big assumption, meaning
 6 that any of those exposures are
 7 irrelevant for NHL which I don't want to
 8 make, but once we do that, we see that
 9 the exposures prior to 1995 seem to at
 10 least suggest that there are quite a few
 11 risk ratios above 1.
 12 MR. LASKER: Objection to form.
 13 BY MS. FORGIE:
 14 Q. Just to clarify, you're looking at
 15 the 2018 AHS publication Table 3; is that
 16 correct?
 17 A. Yes, correct.
 18 Q. Okay. And what is the relative
 19 risk, for example, for diffuse large B cell
 20 lymphoma in the 20-year lag period?
 21 MR. LASKER: Objection to form.
 22 THE WITNESS: It's 1.35 for the
 23 20-year lag and the highest exposure
 24 level, and it's 1.24 in that medium.
 25 MR. LASKER: For purposes of

<p style="text-align: right;">Page 166</p> <p>1 completion, the quote, quartile 1, it's 2 0.89, and for quartile 3, it's 0.9 in 3 the same chart. 4 THE WITNESS: Correct, because it's 5 classification. 6 MS. FORGIE: Wait, wait, I'm asking 7 the questions, not Eric, despite his 8 attempt to jump in. 9 BY MS. FORGIE: 10 Q. Did the 2018 AHS publication use 11 the same method in terms of comparing high 12 doses to low doses as the 2005 DeRoos 13 publication? 14 A. No, it doesn't. 15 Q. And for purposes of clarification, 16 is the 2005 DeRoos study also an AHS -- 17 A. Yes. 18 Q. -- publication. Okay. 19 What is the difference in the 20 method? 21 MR. LASKER: Objection to form. 22 Beyond the scope, outside of her 23 opinions in her supplemental expert 24 report. 25 THE WITNESS: So what DeRoos did is</p>	<p style="text-align: right;">Page 168</p> <p>1 all. 2 Q. You were asked several questions 3 about biomonitoring studies and sensitivity 4 analysis that were recommended for the AHS 5 study. Do you remember those questions? 6 A. Yes. 7 Q. Did any of those sensitivity 8 analysis publications or bio -- let's start 9 one at a time. Did any of the sensitivity 10 analysis publications solve any of the 11 substantial problems that you've addressed 12 with regard to the 2018 publication? 13 A. No, because they only address a 14 partial picture at a time. They never 15 address the whole picture. 16 Q. Did any of the biomonitoring 17 studies or publications that you were asked 18 about solve any of the problems which you 19 discussed with regard to the AHS 20 publication? 21 A. No, they don't. And that's because 22 biomonitoring studies are really short-term 23 studies. They do not tell you what happens 24 over a 30-year period. When we talk about 25 cancer, we really have to consider chronic</p>
<p style="text-align: right;">Page 167</p> <p>1 she used tertiles of exposure but only 2 among the exposed. So if she's 3 comparing low to high exposure, assuming 4 that these people are more exchangeable 5 or more similar with respect to all risk 6 factors to NHL, then farmers who use 7 absolutely no glyphosate compared to 8 those who either use less or a lot of 9 glyphosate. 10 BY MS. FORGIE: 11 Q. And why is that important? 12 A. It is very important because it 13 points out residual confounding. 14 Q. What is residual confounding? 15 A. Residual confounding can bias 16 estimates in any direction, and if residual 17 confounding for the non-exposed to 18 glyphosate means there are risk factors that 19 we haven't taken care of, we would have an 20 increased risk among the non-exposed which 21 would then give us protective effects for 22 glyphosate that we haven't taken care of. 23 Q. And do you think that glyphosate 24 has a protective effect with regard to NHL? 25 A. I would not make that assumption at</p>	<p style="text-align: right;">Page 169</p> <p>1 exposures over a long period of time. 2 And biomonitoring gives you 3 something very acute and within the period 4 that you're doing the biomonitoring, and 5 you're only doing it in a hundred people or 6 less because it's expensive. And then 7 you're assuming that they're representative 8 of the whole cohort in terms of what you're 9 learning from them. 10 Q. And you were asked several 11 questions about whether or not there were 12 publications that support your statements in 13 your supplemental report. Do you remember 14 those questions? 15 A. Yes. 16 MR. LASKER: Objection to form. 17 BY MS. FORGIE: 18 Q. And are there such publications 19 that support your opinions? 20 A. Yes, there are. 21 Q. And can you just tell me a couple 22 of those, please? 23 A. Yeah, the Gray paper. It's the 24 Blair 2002 paper. It's the Ward editorial 25 for the AHS 2018, and it's the Acquavella</p>

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1 paper from -- I don't know when it was.
 2 MR. LASKER: 1997?
 3 THE WITNESS: Yeah.
 4 MR. ESFANDIARY: 2016.
 5 MR. LASKER: No, 1997 and she said,
 6 yeah. Please don't testify for the
 7 witness.
 8 (Simultaneous cross-talk
 9 interrupted by the reporter.)
 10 MS. FORGIE: I don't think we have
 11 it.
 12 BY MS. FORGIE:
 13 Q. Let's go to the Gray paper. What
 14 exhibit number is that, please?
 15 A. This is Exhibit Number 30-18.
 16 Q. Can you tell me what in 30-18 in
 17 the Gray paper supports your statements in
 18 your supplemental report, please?
 19 MR. LASKER: Objection to form.
 20 The witness has already prepared a
 21 supplemental report and she cited parts
 22 of authority Gray 2000. This is not
 23 proper redirect.
 24 BY MS. FORGIE:
 25 Q. You can answer.

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1 A. I before was shown all of the --
 2 all of the notes that these authors made in
 3 terms of what would improve the study and
 4 told that this would be really solving the
 5 problems. Well, they are pointing out under
 6 study design perspective cohort studies --
 7 Q. Can you tell us what page you're
 8 on?
 9 A. Yeah, it's page 64. Exactly the
 10 two points or the two of the four points I'm
 11 making. One is at the end of the first
 12 paragraph where it says --
 13 MR. LASKER: I'm sorry. Where are
 14 you? The top of the page?
 15 THE WITNESS: 64 end of the first
 16 paragraph.
 17 MR. LASKER: Paragraph starting
 18 "Determining exposure status prior to"?
 19 THE WITNESS: Yes. So the last
 20 sentence here states, "It is critical
 21 that follow-up surveys of the cohort be
 22 administered on a regular basis to
 23 document how exposure and disease states
 24 change as subjects age."
 25 ///

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1 BY MS. FORGIE:
 2 Q. And how does that fit into your
 3 supplemental report, or how does it support
 4 your supplemental report?
 5 MR. LASKER: Objection to form.
 6 MS. FORGIE: Let me rephrase it so
 7 it's not compound.
 8 BY MS. FORGIE:
 9 Q. How does that statement from the
 10 Gray article support your supplemental
 11 report?
 12 MR. LASKER: Objection to form.
 13 THE WITNESS: Well, it helps my
 14 argument that I've been making that you
 15 really need to in situations where
 16 exposures are time changing, you need
 17 follow-up surveys to assess exposures
 18 that are changing. You cannot just go
 19 with a baseline assessment of exposure
 20 ignoring all the changes in exposure,
 21 and they're also saying you need
 22 follow-up surveys that should be
 23 administered on a regular basis. Five
 24 years is a very long period between
 25 interviews, and it's not just five years

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

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1 the study."
 2 So acceptable response rates are
 3 very important, and a 63 percent
 4 response rate when you have to update
 5 exposures that are changing I don't
 6 think are acceptable.
 7 BY MS. FORGIE:
 8 Q. Okay. Anything else in the Gray
 9 study?
 10 A. That's it.
 11 Q. Okay. And turning now to the Blair
 12 publication which I believe is in there.
 13 A. Yes.
 14 Q. Let's find the number first.
 15 A. 30-19.
 16 Q. Let's wait until they find it.
 17 MR. LASKER: Okay.
 18 BY MS. FORGIE:
 19 Q. What in that Blair 2002 article
 20 supports your opinions as expressed in your
 21 supplemental report, please.
 22 MR. LASKER: Objection to form.
 23 BY MS. FORGIE:
 24 Q. You can answer.
 25 A. Page 98, the second column, first

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1 paragraph, so it's pretty much the second to
 2 last --
 3 MR. LASKER: I'm sorry. Where are
 4 you? Second column?
 5 THE WITNESS: Second column. There
 6 are two columns. The right column. In
 7 the middle of that first
 8 paragraph column it states, "If the true
 9 relative risk was two," do you have
 10 that.
 11 MR. LASKER: Yeah, I'm with you.
 12 THE WITNESS: "Calculated relative
 13 risks for individual pesticides would be
 14 from 1.1 to 1.6. Even though the level
 15 of agreement is quite high, the impact
 16 of misclassification in this range on
 17 the relative risk can be substantial and
 18 diminish the opportunity to detect real
 19 associations."
 20 BY MS. FORGIE:
 21 Q. And how does that statement from
 22 the Blair article support the opinions that
 23 you expressed in your supplemental report?
 24 MR. LASKER: Objection to form.
 25 ///

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1 BY MS. FORGIE:
 2 Q. You can answer.
 3 A. It explains exactly the argument
 4 I've been making about non-differential
 5 misclassification doing what I said it
 6 would.
 7 Q. With regard to -- do we have
 8 another sticky, please.
 9 MR. LASKER: I gave them all to
 10 you.
 11 MS. FORGIE: Thank you. I'm going
 12 to mark as 21 the Acquavella article.
 13 (Exhibit Number 30-21 was
 14 marked for identification.)
 15 MS. FORGIE: Or is that already in
 16 there, the 2006 Acquavella.
 17 THE WITNESS: I don't think so.
 18 MS. FORGIE: I only have one copy.
 19 We'll do the other one first. Let's do
 20 30-22.
 21 (Exhibit Number 30-22 was
 22 marked for identification.)
 23 BY MS. FORGIE:
 24 Q. Can you tell me what I've just
 25 marked as Exhibit 30-22, the Ward editorial.

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1 Can you tell me what that is, please.
 2 MR. LASKER: Objection to form.
 3 Beyond the scope. This document was not
 4 even discussed during the direct
 5 deposition.
 6 BY MS. FORGIE:
 7 Q. You can answer.
 8 A. It's an editorial written by
 9 Elizabeth Ward, who is a very well-known
 10 pesticide and cancer researcher on the
 11 glyphosate use and cancer incidence in the
 12 AHS study in epidemiologic perspective. So
 13 it's an editorial on the actual NCI 2018
 14 study.
 15 Q. Do you know if it was published in
 16 the same journal at the same time as the
 17 2018 AHS publication?
 18 A. That's what it looks like.
 19 Q. Okay. And can you tell me what in
 20 this Ward editorial supports your opinions
 21 as expressed in your supplemental expert
 22 report, please.
 23 A. Yes. On page 2, the first long
 24 paragraph on the left, the last sentence.
 25 Q. Can you read that?

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1 MR. LASKER: Hold on a second.
 2 Where are you?
 3 THE WITNESS: Page 2. First
 4 paragraph. The end, the last sentence.
 5 MR. LASKER: "Thus although"?
 6 THE WITNESS: "Thus although."
 7 MR. LASKER: Thank you.
 8 THE WITNESS: "Thus although
 9 pesticide applicators likely provide the
 10 best opportunity for investigating the
 11 risk associated with glyphosate
 12 exposure, the intermittent nature and
 13 range of exposure may limit the ability
 14 of studies in this population to detect
 15 cancer hazards."
 16 BY MS. FORGIE:
 17 Q. Can you explain how that statement
 18 supports the opinions that you gave as
 19 expressed in your supplemental report,
 20 please?
 21 MR. LASKER: Object to form.
 22 THE WITNESS: What it points to is
 23 the possibility of exposure
 24 misclassification due to the
 25 intermittent nature and the range of

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1 exposures and, therefore, the
 2 opportunities to generate
 3 nondifferential misclassification of
 4 exposure especially over a very long
 5 period of time and especially in
 6 environment where exposures change.
 7 MS. FORGIE: Give us one minute
 8 while we get that extra copy and then
 9 we're almost done.
 10 MR. LASKER: Don't forget my
 11 3 minutes and 30 seconds.
 12 MS. FORGIE: I'm sure if I did
 13 forget it, you would remind me.
 14 MR. LASKER: So what is this,
 15 30-20?
 16 MS. FORGIE: Didn't we mark it the
 17 Acquavella?
 18 THE WITNESS: 21.
 19 BY MS. FORGIE:
 20 Q. 30-21. And is there anything in
 21 what we've marked now as 30-21, the
 22 Acquavella study from 2006, that supports
 23 your opinions as expressed in your
 24 supplemental expert report?
 25 MR. LASKER: Objection to scope,

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

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

1 supplemental report?

2 MR. LASKER: Objection to form.

3 THE WITNESS: Because the algorithm
4 they developed is really a generic
5 algorithm, meaning that they are using
6 duration and frequency and weighing it
7 according to the exact same weights for
8 every pesticide. So if somebody reports
9 a protective equipment used, then that
10 protective equipment is presumed to be
11 used for every single pesticide; so
12 every single pesticide will be weighted
13 accordingly whether or not that
14 protective equipment was actually used
15 for one and not the other pesticide is
16 not known and is not taken into
17 consideration. Neither are the
18 formulations of pesticides.

19 MR. LASKER: Further objection to
20 this line of questioning because there
21 would be no opportunity for defense
22 counsel to be prepared to question
23 Dr. Ritz on a paper that she did not
24 include in her reference list for her
25 supplemental expert report, did not

1 mention in her supplemental expert
2 report and the fact that this is new
3 opinions being offered in redirect or
4 cross-examination based upon a document
5 the expert had not previously disclosed.

6 BY MS. FORGIE:

7 Q. Do you agree with Dr. Acquavella
8 that the way the data was collected in the
9 AHS publication suggests that it is likely
10 to result in appreciable exposure
11 misclassification for many pesticides?

12 MR. LASKER: Objection to form.

13 THE WITNESS: I agree partially. I
14 agree for the pesticides that had a lot
15 of time varying components to them.

16 BY MS. FORGIE:

17 Q. And did glyphosate have a lot of
18 time varying components to it?

19 A. Yes.

20 Q. So with regard to glyphosate, you
21 would agree with Dr. Acquavella that the
22 method of collection in the AHS study was
23 likely to result in appreciable exposure
24 misclassification; is that correct?

25 A. Correct.

1 MR. LASKER: Objection to form.

2 BY MS. FORGIE:

3 Q. Do you know who Dr. Acquavella is?

4 A. Yes.

5 Q. Who is he?

6 A. Dr. Acquavella was, for some time,
7 employed by Monsanto as their epidemiologist
8 and he came to several of the AHS study
9 meetings, one of them to actually talk about
10 biomonitoring to the panel.

11 MS. FORGIE: Okay. I don't have
12 any questions.

13 MR. LASKER: You mean any further
14 questions?

15 MS. FORGIE: Any further questions.

16 MR. LASKER: Let's take a quick
17 break so we can get ourselves organized
18 but nobody leave the room. This will
19 not be 40 minutes.

20 THE VIDEOGRAPHER: We're off the
21 record at 6:05 p.m.

22 (Recess taken from 6:05 p.m. to
23 6:06 p.m.)

24 THE VIDEOGRAPHER: We are back on
25 the record at 6:06 p.m.

1 FURTHER EXAMINATION
2 BY MR. LASKER:

3 Q. Dr. Ritz, in your answers to the
4 questions from defense counsel, if I
5 understand correctly, you criticized the
6 2018 NCI study because it did not compare
7 exposures -- it compared exposures to
8 non-exposed as opposed to exposures within
9 the different exposure groups; is that
10 correct?

11 MS. FORGIE: Object to form.

12 THE WITNESS: I pointed out one
13 sort of potential bias that could have
14 biased away from the null.

15 BY MR. LASKER:

16 Q. Because of that?

17 A. Because of that.

18 Q. Your initial expert report on
19 page 30 -- on page 23, here you're talking
20 about the DeRoos 2005 paper; correct?

21 A. Yes.

22 Q. And in that -- in your initial
23 expert report, you state that authors decide
24 to compare the cancer risk in these exposed
25 groups, not, underlined, to that among the

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1 never exposed but instead compared high
 2 exposure to low exposure while this type of
 3 comparison attempts to control for and
 4 eliminate other risk factors that may
 5 distinguish non-exposed from exposed, hence
 6 reduce potential confounding bias. This
 7 type of approach also reduces any remaining
 8 exposure contrast even further and thus
 9 reduces the ability to estimate risk
 10 increases with exposure and make the effect
 11 estimates also less comparable to those from
 12 other studies; correct?
 13 A. Yes --
 14 MS. FORGIE: Object to form.
 15 THE WITNESS: I'm completely
 16 standing behind this because I'm already
 17 pointing out the potential confounding
 18 bias.
 19 BY MR. LASKER:
 20 Q. So in your initial expert report
 21 with the 2005 paper, you made a criticism
 22 because they didn't compare exposure groups
 23 to non-exposed, didn't you?
 24 MS. FORGIE: Object to form.
 25 THE WITNESS: No, I'm not making a

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1 criticism. I'm pointing out that this
 2 is a very useful method to reduce
 3 potential confounding, however, you buy
 4 the reduction in bias with a reduced
 5 ability to find a true effect.
 6 BY MR. LASKER:
 7 Q. Exhibit 30-22, the Ward editorial,
 8 next document they had you look at.
 9 A. Yes.
 10 Q. In the first page of the editorial,
 11 the second column, the first full
 12 paragraph which you did not read from
 13 Dr. Ward states "Although the Andreotti, et
 14 al study?
 15 A. Where's that?
 16 Q. Right-hand column, first full
 17 paragraph?
 18 A. Yes, okay.
 19 Q. "Dr. Ward states that although the
 20 Andreotti, et al, study, the 2018 study adds
 21 substantially to the body of epidemiologic
 22 evidence regarding the potential association
 23 between glyphosate exposure and cancer in
 24 humans, interpreting the new findings in the
 25 context of previous studies may be

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1 difficult"; correct?
 2 A. That's what it says.
 3 Q. Do you agree the 2018 NCI study
 4 adds substantially to the body of
 5 epidemiologic evidence regarding the
 6 potential association between glyphosate
 7 exposure and cancer in humans?
 8 A. I don't know what she means by
 9 "substantially," but it helped me understand
 10 what the problems with the study were, yes.
 11 Q. And my last question with respect
 12 to the testimony that you gave regarding
 13 protective equipment is that your
 14 understanding that glyphosate has low acute
 15 toxicity?
 16 MS. FORGIE: Object to form.
 17 THE WITNESS: My understanding is
 18 that OP pesticides are much more easily
 19 irritative and having effects on a
 20 farmer that would make him want to wear
 21 protective equipment than glyphosate
 22 would.
 23 BY MR. LASKER:
 24 Q. My question, though, is it your
 25 understanding that glyphosate has low acute

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1 toxicity?
 2 MS. FORGIE: Object to form. Asked
 3 and answered.
 4 You can answer it again.
 5 THE WITNESS: My understanding of
 6 pesticide acute effects is that OP
 7 pesticides have effects that will make
 8 farmers use protection probably at a
 9 much higher level than glyphosate would.
 10 BY MR. LASKER:
 11 Q. I didn't ask about OP pesticides.
 12 I've asked a simple question. Is it your
 13 understanding that glyphosate has low acute
 14 toxicity?
 15 MS. FORGIE: Objection. Asked and
 16 answered twice.
 17 You can answer it again.
 18 Where are we on time?
 19 THE WITNESS: I was not talking
 20 about an absolute toxicity. I was
 21 talking about a relative toxicity, and
 22 relativeness has to be with respect to
 23 other pesticides because these farmers
 24 were applying multiple pesticides, and,
 25 therefore -- and they were only asked to

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1 respond with regard to protective
 2 equipment in one question that does not
 3 specify the pesticide. So the farmer
 4 when they are asked this question has to
 5 actually compare the toxicities in his
 6 head or he had to compare them before
 7 and then report what he's been using for
 8 the most -- for the one with the most
 9 side effects.
 10 BY MR. LASKER:
 11 Q. Dr. Ritz, is it your understanding
 12 that glyphosate has low acute toxicity?
 13 MS. FORGIE: Objection. Asked and
 14 answered three times. You can answer it
 15 a fourth time.
 16 THE WITNESS: This is not a
 17 question that I wanted to point out as
 18 an acute -- as an absolute. It is
 19 something that the farmer was asked to
 20 compare. It's a relative comparison of
 21 acute toxicities. And in terms of --
 22 everybody rates risks, and if I'm a
 23 bungee jumper, my risk rating is
 24 probably different from somebody who is
 25 a grandmother. So we are all rating our

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1 risks in engaging with certain
 2 activities in a different way.
 3 So a farmer who would be co-exposed
 4 to glyphosate and organophosphates when
 5 asked what kind of protective equipment
 6 they are using would probably go with
 7 the one that he knows he has the most
 8 side effects from and report on that
 9 one.
 10 BY MR. LASKER:
 11 Q. Dr. Ritz, is it your understanding
 12 that glyphosate has low acute toxicity?
 13 MS. FORGIE: Objection. Asked and
 14 answered four times.
 15 You can answer it again.
 16 Where are we on time?
 17 THE VIDEOGRAPHER: It's been five
 18 minutes since you started.
 19 MS. FORGIE: Okay. That's it.
 20 She's not going to answer it.
 21 MR. LASKER: She clearly is not
 22 going to answer it, but I started asking
 23 the question a couple minutes ago and
 24 still haven't got an answer.
 25 MS. FORGIE: It's over. It's been

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1 five minutes.
 2 MR. LASKER: Are you instructing
 3 the witness not to answer the question?
 4 MS. FORGIE: I'm saying you've had
 5 three-and-a-half minutes. You've gone
 6 five minutes. The time is up. I don't
 7 need to instruct her not to answer
 8 because the time is up.
 9 BY MR. LASKER:
 10 Q. Dr. Ritz, does glyphosate have low
 11 acute toxicity?
 12 MS. FORGIE: We're done. The time
 13 is up. She's already answered it four
 14 times anyway.
 15 I want to put one statement on the
 16 record. Counsel stated that Dr. Ritz
 17 and by implication myself had not
 18 discussed the Acquavella 2006 article.
 19 In fact, it is number one on the
 20 supplemental materials list that was
 21 provided to counsel.
 22 MR. LASKER: If I misstated it, I
 23 will correct myself.
 24 MS. FORGIE: We all make mistakes,
 25 but it's right there.

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1 MR. LASKER: It's Andreotti. Oh,
 2 the supplemental materials list
 3 related -- I'm not sure what this is. I
 4 will accept the representation. I was
 5 looking at expert report, the
 6 supplemental expert report which has a
 7 material -- has a reference list that
 8 does not mention Acquavella.
 9 MS. FORGIE: Right, but this is
 10 Muchy and Ryder which she couldn't have
 11 had when she did her report.
 12 MR. LASKER: I will rephrase my
 13 objection accordingly. I object to the
 14 questioning regarding a study and
 15 reliance upon a study, the Acquavella
 16 2006 study that Dr. Ritz never mentions
 17 in her supplemental report and is not on
 18 the reference list for her supplemental
 19 expert report.
 20 MS. FORGIE: I don't agree with any
 21 of that but we're done.
 22 (Testimony continues on the
 23 following page in order to
 24 include jurat.)
 25

1 THE VIDEOGRAPHER: This concludes
 2 today's proceedings in the deposition of
 3 Dr. Beate Ritz. We're off the record at
 4 6:14 p.m.
 5 (Time noted: 6:14 p.m.)
 6

7
 8
 9
 10
 11
 12
 13 _____
 14 Beate Ritz, M.D., Ph.D.

15
 16 Subscribed and sworn to before me
 17 this day of , 2018.
 18

19 _____
 20 (Notary Public)
 21
 22 My Commission expires: _____
 23
 24
 25

1 NAME OF CASE:
 2 DATE OF DEPOSITION:
 3 DEPONENT:
 4 1. To clarify the record.
 5 2. To conform to the facts.
 6 3. To correct transcription error.

7 Page _____ Line _____ Reason _____
 8 From _____ to _____

9 Page _____ Line _____ Reason _____
 10 From _____ to _____

11 Page _____ Line _____ Reason _____
 12 From _____ to _____

13 Page _____ Line _____ Reason _____
 14 From _____ to _____

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19 Page _____ Line _____ Reason _____
 20 From _____ to _____

21 Page _____ Line _____ Reason _____
 22 From _____ to _____

23 Page _____ Line _____ Reason _____
 24 From _____ to _____

25 Page _____ Line _____ Reason _____
 From _____ to _____

1 CERTIFICATE
 2 STATE OF CALIFORNIA:
 3

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

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

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

16 IN WITNESS WHEREOF, I have hereunto set
 17 my hand this 20th day of January, 2018.
 18

19
 20
 21 _____
 22 LISA MOSKOWITZ, CSR 10816, RPR, CRR, CLR
 23 NCRA Realtime Systems Administrator
 24
 25

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