

# **Exhibit 1**



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# Transcript of Dr. Christopher Portier

**Date:** January 12, 2018

**Case:** In Re: Roundup Products Liability Litigation

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Transcript of Dr. Christopher Portier  
 Conducted on January 12, 2018

<p style="text-align: center;">1</p> <p>1 UNITED STATES DISTRICT COURT                  NORTHERN DISTRICT OF CALIFORNIA</p> <p>2</p> <p>3 -----                  IN RE: ROUNDUP PRODUCTS ) MDL No. 2741                  LIABILITY LITIGATION ) Case No.                  ) 16-md-02741-VC                  -----</p> <p>5</p> <p>6</p> <p>7 DEPOSITION OF DR. CHRISTOPHER PORTIER</p> <p>8 Friday, January 12th 2018</p> <p>9 AT: 11.00 am</p> <p>10</p> <p>11</p> <p>12 Taken at:</p> <p>13 Hilton London Heathrow Airport                  Terminal 4                  Hounslow TW6 3AF                  United Kingdom</p> <p>14</p> <p>15</p> <p>16</p> <p>17</p> <p>18</p> <p>19</p> <p>20 Job ref: 173050</p> <p>21 Pages: 1 - 126</p> <p>22 Reporter: Claire G. Hill RPR CRC</p> <p>23</p> <p>24</p> <p>25</p>	<p style="text-align: center;">3</p> <p style="text-align: center;">I N D E X</p> <p>1</p> <p>2 DR. CHRISTOPHER PORTIER .....6</p> <p>3 DIRECT EXAMINATION BY MR. LASKER .....6</p> <p>4 CROSS-EXAMINATION BY MS. GREENWALD .....122</p> <p>5</p> <p>6</p> <p>7</p> <p style="text-align: center;">E X H I B I T S</p> <p>8</p> <p>9 Exhibit 28-1 Glyphosate Use and Cancer Incidence 6                  in the Agricultural Health Study,                  Andreotti et al, JNCI (2018) 110(5):                  dx233 (14 pages)</p> <p>10</p> <p>11 Exhibit 28-2 Differences in the carcinogenic 9                  evaluation of glyphosate between the                  IARC and the EFSA, Portier et al, JECH                  August 2016, Vol 70, No 8 (5 pages)</p> <p>12</p> <p>13 Exhibit 28-3 Expert Report of Christopher Portier 11                  (96 pages)</p> <p>14</p> <p>15 Exhibit 28-4 Comments of Christopher Portier on 12                  USEPA, October 4, 2016 (20 pages)</p> <p>16</p> <p>17 Exhibit 28-5 Integrative assessment of multiple 18                  pesticides as risk factors for                  non-Hodgkin's lymphoma among men,                  De Roos et al, Occup Environ Med                  2003;60:e11 (9 pages)</p> <p>18</p> <p>19 Exhibit 28-6 Supplemental Expert Report of 30                  Christopher Portier (6 pages)</p> <p>20</p> <p>21 Exhibit 28-7 Cancer incidence among 34                  glyphosate-exposed pesticide                  applicators in the Agricultural Health                  Study, De Roos et al, Environmental                  Health Perspectives, Vol 113, No 1,                  January 2005 (6 pages)</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p>
<p style="text-align: center;">2</p> <p style="text-align: center;">A P P E A R A N C E S</p> <p>1</p> <p>2 Appearing on behalf of the Plaintiffs:</p> <p>3 ROBIN L. GREENWALD</p> <p>4 WEITZ &amp; LUXENBERG                  700 Broadway                  New York, NY 10003                  Telephone: (212) 558-5500</p> <p>5</p> <p>6</p> <p>7 JEFFREY TRAVERS (by telephone)</p> <p>8 THE MILLER FIRM LLC                  The Sherman Building                  108 Railroad Avenue                  Orange, VA 22960                  Telephone: (540) 672-4224</p> <p>9</p> <p>10 Appearing on behalf of the Defendant, Monsanto Company:</p> <p>11 ERIC G. LASKER                  JOHN M. KALAS (by telephone)</p> <p>12 HOLLINGSWORTH LLP                  1350 I Street NW                  Washington DC 20005                  Telephone: (202) 898-5800</p> <p>13</p> <p>14 Also Present:</p> <p>15 David Ross Elliott                  Videographer</p> <p>16</p> <p>17</p> <p>18</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p>	<p style="text-align: center;">4</p> <p>1 Exhibit 28-8 Reliability of reporting on lifestyle 58                  and agricultural factors by a sample of                  participants in the Agricultural Health                  Study from Iowa, Blair et al,                  Epidemiology, January 2002, Vol 13, No                  1 (6 pages)</p> <p>2</p> <p>3</p> <p>4 Exhibit 28-9 Exposure misclassification in studies 67                  of agricultural pesticides, Acquavella                  et al, Epidemiology, Vol 17, No 1,                  January 2006 (6 pages)</p> <p>5</p> <p>6</p> <p>7 Exhibit 28-10 Impact of pesticide exposure 72                  misclassification on estimates of                  relative risks in the Agricultural                  Health Study, Blair et al, Occup                  Environ Med 2011;68:537-541 (5 pages)</p> <p>8</p> <p>9</p> <p>10 Exhibit 28-11 Using multiple imputation to assign 78                  pesticide use for non-responders in the                  follow-up questionnaire in the                  Agricultural Health Study, Heltshe et                  al, Journal of Exposure Science and                  Environmental Epidemiology, (2012) 22,                  409-416 (8 pages)</p> <p>11</p> <p>12</p> <p>13</p> <p>14 Exhibit 28-12 Effects of self-reported health 79                  conditions and pesticide exposures on                  probability of follow-up in a                  prospective cohort study, Montgomery et                  al, American Journal of Industrial                  Medicine 53:486-496 (2010) (11 pages)</p> <p>15</p> <p>16</p> <p>17 Exhibit 28-13 E-mail string beginning Nov 9, 2017, 11                  Portier to Pigeon (1 page)</p> <p>18</p> <p>19 Exhibit 28-14 E-mail with attachments, Nov 10, 111                  2017, Portier to Stecker (1 page)</p> <p>20</p> <p>21 Exhibit 28-15 E-mail string beginning Nov 12, 111                  2017, Bellé to Portier (2 pages)</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p>

Transcript of Dr. Christopher Portier  
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2 (5 to 8)

5	<p>1 Friday, January 12th 2018 2 (10.54 am) 3 THE VIDEOGRAPHER: Good morning, this is 4 the beginning of media 1, volume I in the video 5 deposition of Dr. Christopher Portier. This is 6 being held at Hilton London Heathrow Airport 7 Terminal 4, Hounslow, TW6 3AF, in the 8 United Kingdom. This is being taken on 12th January 9 2018, at 10.55 am as indicated on the video screen. 10 This deposition is in the matter In Re 11 Roundup® Products Liability Litigation, the MDL 12 number is 2741, and the case number is 13 16-md-02741-VC. It's being heard before the 14 United States District Court in the Northern 15 District of California. 16 The court reporter today is Claire Hill, 17 of Planet Depos, and my name is David Ross Elliott, 18 and I am the official certified videographer here, 19 also on behalf of Planet Depos. 20 And now I would like to ask all of counsel 21 to introduce themselves, please, and who they 22 represent. 23 MR. LASKER: Yes, this is Eric Lasker of 24 Hollingsworth LLP, representing Monsanto. 25 MS. GREENWALD: Robin Greenwald of Weitz &amp;</p>	7
6	<p>1 Luxenberg representing the plaintiffs. 2 MR. KALAS: John Kalas, Hollingsworth LLP, 3 representing Monsanto, appearing via telephone. 4 THE VIDEOGRAPHER: Would the court 5 reporter please swear in the witness? 6 CHRISTOPHER PORTIER, 7 having been duly sworn, 8 testified as follows: 9 DIRECT EXAMINATION BY MR. LASKER: 10 Q. Good morning, Dr. Portier. 11 <b>A. Good morning.</b> 12 Q. So since the last time we have met, 13 there has been a new epidemiologic study published 14 that looks at whether there is an association 15 between glyphosate-based herbicides and 16 non-Hodgkin's lymphoma, correct? 17 <b>A. Correct.</b> 18 Q. That is a study that was lead 19 authored by Andreotti and other scientists that is 20 set to be published in the Journal of the National 21 Cancer Institute in 2018, correct? 22 <b>A. Yes.</b> 23 Q. Let's go ahead and mark as 24 exhibit 28-1 the new study. 25 (Exhibit 28-1 marked for identification)</p>	8
5	<p>1 Q. This is the 2018 glyphosate study, 2 correct, Dr. Portier? 3 <b>A. Yes.</b> 4 Q. This paper was coauthored by 12 5 scientists who work for various agencies or entities 6 within the National Institutes of Health, correct? 7 MS. GREENWALD: Objection, form. 8 <b>A. No, that is not correct.</b> 9 Q. Okay. Are there individuals here who 10 you believe are not associated with the National 11 Institutes of Health? 12 <b>A. That is correct.</b> 13 Q. Which scientists are not associated 14 with the National Institutes of Health? 15 <b>A. Anneclaire De Roos is with Drexel 16 University. Charles Lynch is with the State Health 17 Registry of Iowa, Iowa City, Iowa. No, I'm sorry, 18 he's with the Department of Epidemiology, University 19 of Iowa. And also with the State Health Registry of 20 Iowa, in Iowa City.</b> 21 Q. So ten scientists with the National 22 Institutes of Health and two independent 23 academicians? 24 <b>A. That appears to be the case, yes.</b> 25 Q. The Journal of the National Cancer</p>	7
6	<p>1 Institute is a highly respected scientific journal, 2 correct? 3 MS. GREENWALD: Objection, form. 4 <b>A. I don't consider journals that way, 5 in terms of whether they're respected or not. It's 6 the individual publications in the journals that 7 matter, about how good the publications are. It's 8 a highly read journal.</b> 9 Q. And there is a ranking scheme, if you 10 will, for journals called an impact factor, you're 11 familiar with that, correct? 12 <b>A. Yes, I am.</b> 13 Q. With respect to impact factor, as far 14 as how impactful the journal is, the Journal of the 15 National Cancer Institute is one of the most 16 impactful cancer journals in the world, correct? 17 MS. GREENWALD: Objection, form. 18 <b>A. I wouldn't know.</b> 19 Q. Okay. The -- directing you to the 20 abstract, for the National Cancer Institute -- the 21 2018 National Cancer Institute study, this study, 22 I am quoting from the abstract -- 23 MR. TRAVERS: My name is Jeffrey Travers, 24 Miller Law Firm, representing the plaintiffs. 25 Q. So Dr. Portier, the 2018 National</p>	8

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3 (9 to 12)

9	<p>1 Cancer Institute journal study updated the 2 Agricultural Health Study's previous evaluation of 3 glyphosate in the 2005 De Roos study with cancer 4 institute -- cancer incidence from registries 5 through the end of 2012 or 2013, correct? 6 MS. GREENWALD: Objection, form. 7 <b>A. That is correct.</b> 8 Q. You previously had criticized the 9 earlier AHS analysis in De Roos 2005 as not having 10 sufficient follow-up time, correct? 11 <b>A. That is one of my -- that was one of</b> 12 <b>my concerns, that is correct.</b> 13 Q. Let's mark as 28-2 a publication that 14 has you as the lead author. 15 (Exhibit 28-2 marked for identification) 16 Q. This is an article that you were the 17 lead author of, that was published in the Journal of 18 Epidemiology and Community Health. 19 <b>A. That is correct.</b> 20 Q. And this was a publication in which 21 you were discussing differences between the IARC 22 evaluation and the European Food Safety Authority 23 analysis of glyphosate in cancer, correct? 24 MS. GREENWALD: Objection, form. 25 <b>A. You have lost me through the</b></p>	11
10	<p>1 <b>sentence. Could you repeat it, please?</b> 2 Q. In this article, you were comparing 3 the IARC analysis of glyphosate and the EFSA 4 analysis of glyphosate, correct? 5 MS. GREENWALD: Objection, form. 6 <b>A. I am not sure we're comparing it. We</b> 7 <b>are commenting on the scientific issues that we saw</b> 8 <b>with the EFSA evaluation and to some degree how</b> 9 <b>those compare with IARC.</b> 10 Q. On page 742, the second page of this 11 publication, you state, and it's in the left-hand 12 column, at the top, discussing the prior 2005 De 13 Roos study, that: 14 "... the median follow-up time in the 15 Agricultural Health Study was 6.7 years, which is 16 unlikely to be long enough to account for cancer 17 latency." 18 Correct? 19 MS. GREENWALD: Where are you reading 20 from? I can't find it. 21 MR. LASKER: It is in the upper left-hand 22 column, first paragraph, last sentence. 23 Q. So again, on page 742? 24 <b>A. Yes.</b> 25 Q. I'll state it again. One of the</p>	12
11	<p>1 criticisms you state of the De Roos 2005 study was 2 that "the median follow-up time in the AHS was 6.7 3 years, which is unlikely to be long enough to 4 account for cancer latency", correct? 5 <b>A. That is correct.</b> 6 Q. It is your opinion that because the 7 latency period for cancers can be long by years, 8 evaluations of studies should consider whether the 9 exposure occurred sufficiently long ago to be 10 associated with cancer development, correct? 11 MS. GREENWALD: Objection, form. 12 <b>A. I will put it in my own words.</b> 13 <b>Cancer latency is one of the things you must</b> 14 <b>consider in evaluating the epidemiological</b> 15 <b>literature. In this case, I referenced a paper that</b> 16 <b>looked at the estimates of how long it took for</b> 17 <b>non-Hodgkin's lymphoma to form, and 6.7 years was</b> 18 <b>a little short.</b> 19 Q. Just so the record is clear, let me 20 mark as exhibit 28-3, this is your initial expert 21 report in this case. 22 (Exhibit 28-3 marked for identification) 23 <b>A. Okay.</b> 24 Q. If you can turn to page 5 of your 25 initial expert report, and the second to last</p>	11
12	<p>1 paragraph, the final sentence in your report, you 2 state: 3 "Because the latency period for cancers 4 can be long (years), evaluation of studies should 5 consider whether the exposure occurred sufficiently 6 long ago to be associated with cancer development." 7 Correct? 8 <b>A. That is correct.</b> 9 Q. And that is still your opinion, 10 correct? 11 MS. GREENWALD: Objection, form. 12 <b>A. The evaluation should consider, yes,</b> 13 <b>whether exposure occurred sufficiently long ago.</b> 14 Q. For NHL, you have opined that the 15 latency period is likely to be in excess of six 16 years, correct? 17 MS. GREENWALD: Objection, form. 18 <b>A. I don't see that in here. I did</b> 19 <b>a review of that information somewhere in this</b> 20 <b>document. I don't see it in front of me, so I can't</b> 21 <b>tell you exactly what I said.</b> 22 Q. Let's mark as the next document in 23 line, which will be 28-4. 24 (Exhibit 28-4 marked for identification) 25 Q. This is a document that you attached</p>	12

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4 (13 to 16)

<p>13</p> <p>1 to your expert report, and it is comments that you 2 made to the United States Environmental Protection 3 Agency on October 4th 2016, correct? 4 <b>A. Correct.</b> 5 Q. If you turn to page 6 and 7, this may 6 be what you're thinking about, the analysis you did 7 of NHL latency, correct? (Pause). 8 <b>A. Yes.</b> 9 Q. In this analysis you presented to the 10 Environmental Protection Agency, your opinion was 11 that the latency period for NHL for any association 12 with glyphosate is likely to be in excess of six 13 years, correct? 14 MS. GREENWALD: Objection, form. 15 <b>A. I don't say six years exactly, I say</b> 16 <b>it's going to be a little longer than what</b> 17 <b>Weisenburger said, and Weisenburger had one to five</b> 18 <b>years, up to six years.</b> 19 Q. Well, your sentence at the bottom of 20 the paragraph is comparing the lag time to 21 chemotherapy and radiation, which you have, 22 immediately above that, as being median 5.5 years, 23 or median latency of five to six years, correct? 24 <b>A. That's chemotherapy for Hodgkin's</b> 25 <b>disease, not radiation, but yes.</b></p>	<p>15</p> <p>1 <b>both private and commercial.</b> 2 Q. They had cancer incidence data 3 through 2012 or 2013, correct? 4 <b>A. Depending on the state, yes.</b> 5 Q. So that is roughly 40 years after the 6 introduction of glyphosate-based herbicides into the 7 market? 8 <b>A. 1982.</b> 9 Q. 1974? 10 <b>A. Okay, I don't know when it was,</b> 11 <b>that's my problem with it.</b> 12 Q. You would agree that the 2018 13 National Cancer Institute study allows for a longer 14 cancer latency period for non-Hodgkin's lymphoma 15 than any other glyphosate epidemiologic study, 16 correct? 17 <b>A. I can't attest to that.</b> 18 Q. Do you know when the exposure periods 19 were for -- or when the cancer diagnosis periods 20 were for the other epidemiologic studies of 21 glyphosate? 22 MS. GREENWALD: Objection, form. 23 <b>A. Yes, I do. But my concern with</b> 24 <b>answering the question as you stated it is I am</b> 25 <b>aware of other agricultural studies that are looking</b></p>
<p>14</p> <p>1 Q. And you state that it would not be 2 surprising for the glyphosate lag time to be longer 3 than that from chemotherapy and radiation treatment, 4 correct? 5 MS. GREENWALD: Objection, form. 6 <b>A. It would not be surprising for the</b> 7 <b>glyphosate lag time to be longer than that from</b> 8 <b>chemotherapy and radiation treatment, correct.</b> 9 Q. So for an epidemiology study of 10 glyphosate and non-Hodgkin's lymphoma to be 11 meaningful, it should be looking at exposures that 12 predate diagnoses by more than five to six years, 13 correct? 14 MS. GREENWALD: Objection, form. 15 <b>A. No, not correct. It should consider</b> 16 <b>that. Clearly they should consider that, but that's</b> 17 <b>not the only exposures they should look at.</b> 18 Q. Okay, that's fine. The 2018 National 19 Cancer Institute study looked at cancer -- incidence 20 data for some 54,251 pesticide applicators extending 21 nearly 40 years after the introduction of glyphosate 22 on to the market, correct? 23 MS. GREENWALD: Objection, form. 24 <b>A. I don't know about the 40 years, but</b> 25 <b>certainly it is 54,000, give or take, applicators,</b></p>	<p>16</p> <p>1 <b>at glyphosate currently, and I can't be certain they</b> 2 <b>don't actually have longer lag times. But they</b> 3 <b>would be at least as long as this one.</b> 4 Q. Which studies are those? 5 <b>A. There's a study in France, with</b> 6 <b>112,000 -- farmers, they are farmers, they are not</b> 7 <b>pesticide sprayers. And in Norway also, with</b> 8 <b>a cohort of farmers, about 100,000 people.</b> 9 Q. Have either of those cohorts 10 announced their results with respect to glyphosate 11 and non-Hodgkin's lymphoma? 12 <b>A. Not that I'm aware of.</b> 13 Q. Do you have any -- 14 <b>A. If you were asking me about published</b> 15 <b>studies --</b> 16 Q. Yes. 17 <b>A. -- if you rephrase it --</b> 18 Q. I will rephrase it. Are you aware of 19 any analyses from either of those -- either of those 20 cohorts regarding glyphosate and non-Hodgkin's 21 lymphoma that have not been published? 22 <b>A. No.</b> 23 Q. The 2018 National Cancer Institute 24 study allows for a longer cancer latency period for 25 non-Hodgkin's lymphoma than any other published</p>



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5 (17 to 20)

17	<p>1 glyphosate epidemiologic study, correct?  <b>2 A. Correct.</b>  3 Q. You also previously criticized the  4 2005 De Roos study because it had only 92  5 non-Hodgkin's lymphoma cases as compared to 650  6 cases in a pooled case control analysis in the  7 United States, correct?  8 MS. GREENWALD: Objection, form.  <b>9 A. I certainly noted, I am not sure</b>  <b>10 I criticized, but I certainly noted that it had</b>  <b>11 a smaller sample size of exposed cases than did --</b>  <b>12 of cases, period, than did the pooled study by --</b>  <b>13 that De Roos did in 2003.</b>  14 Q. Okay, well, you made a distinction  15 between exposed cases and cases. The pooled  16 analysis that you're referring to in your  17 observation was also by De Roos, but a 2003 study,  18 correct?  19 MS. GREENWALD: Objection, form.  <b>20 A. If we can find it in here, but to the</b>  <b>21 best of my memory, that is correct.</b>  22 Q. And the De Roos 2003 study, in its  23 analysis of glyphosate, only had 36 exposed  24 non-Hodgkin's lymphoma cases, correct?  <b>25 A. No, I think it had more than that,</b></p>	19
18	<p>1 575 non-Hodgkin's lymphoma cases looked at, correct?  2 MS. GREENWALD: Objection, form.  <b>3 A. Those are about in the range of the</b>  <b>4 numbers I remember, I can't be absolutely certain.</b>  5 Q. The numbers are right here on the  6 table, we can add them up, correct?  <b>7 A. Yes, we can add them up.</b>  8 Q. And with respect to the number of 92  9 non-Hodgkin's lymphoma cases in the 2005 study, the  10 2018 National Cancer Institute study is about six  11 times larger than the De Roos 2005 study, correct?  <b>12 A. Five, five and a little bit.</b>  13 Q. Well, there are significantly more  14 non-Hodgkin's lymphoma cases with exposure to  15 glyphosate in the 2018 National Cancer Institute  16 study than there are in all of the case control --  17 the published case control studies of glyphosate and  18 non-Hodgkin's lymphoma combined, correct?  19 MS. GREENWALD: Objection, form.  <b>20 A. Could you -- could you repeat it</b>  <b>21 again?</b>  22 Q. Sure. There are significantly more  23 non-Hodgkin's lymphoma cases with exposure to  24 glyphosate-based herbicides in the 2018 National  25 Cancer Institute study than there are in all of the</p>	20
18	<p>1 published case control studies of glyphosate and  2 non-Hodgkin's lymphoma combined, correct?  3 MS. GREENWALD: Same objection.  <b>4 A. I don't know what "significantly"</b>  <b>5 means here. We can add the numbers up and I can</b>  <b>6 tell you if it's double or if it's triple or if it's</b>  <b>7 1.5 times, but I don't know what "significant"</b>  <b>8 means, so I can't.</b>  9 Q. You would agree that there are more  10 exposed non-Hodgkin's lymphoma cases in the 2018  11 National Cancer Institute study than in all of the  12 published case control studies combined, correct?  <b>13 A. That is correct.</b>  14 Q. The scientists, I guess it's ten  15 scientists from the National Institutes of Health,  16 state in the abstract of the 2018 NCI study, that --  17 in their conclusion:  18 "In this large prospective cohort study,  19 no association was apparent between glyphosate and  20 any solid tumours or lymphoid malignancies overall  21 including non-Hodgkin's lymphoma and its subtypes."  22 Correct?  <b>23 A. First, let me correct something.</b>  <b>24 This is not an NCI study. Having worked at NIH,</b>  <b>25 I know what this is, this is a study produced by</b></p>	20

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6 (21 to 24)

<p style="text-align: right;">21</p> <p>1 scientists, some of whom work for the National          2 Institutes of Health. In the acknowledgments at the          3 end, it makes it very clear that the funders had          4 nothing to do with carrying out this study, they          5 simply supported funding of the study, so you can't          6 really refer to it as being NCI's study. If NCI had          7 done this, and it was an official document from NCI,          8 it would carry a different type of review than what          9 this has received.          10 In answer to your question, that is what          11 it says, in their conclusion at the end of this          12 abstract, word for word.          13 Q. The statement, and we can call it the          14 2018 National Cancer Institute journal study, that          15 there is no -- that no association was apparent          16 between glyphosate and non-Hodgkin's lymphoma, and          17 its subtypes, accurately report the findings set          18 forth in this publication, correct?          19 MS. GREENWALD: Objection, form.          20 A. No, it doesn't, and first of all,          21 it's the Journal of the National Cancer Institute,          22 which actually is not owned by the National Cancer          23 Institute, it's Oxford Press owns that journal, NCI          24 got rid of it, but they bought the title to it.          25 The -- there's nuances to this that are --</p>	<p style="text-align: right;">23</p> <p>1 A. Uh-huh.          2 Q. Again, the ten NIH investigators and          3 two academicians state:          4 "In our study, we observed no associations          5 between glyphosate use and NHL overall or any of its          6 subtypes."          7 Did I read that correctly?          8 A. You did, yes. You read that          9 correctly.          10 Q. And the NIH investigators and          11 academicians state further:          12 "This lack of association was consistent          13 for both exposure metrics ..."          14 Did I read that correctly?          15 MS. GREENWALD: Objection, form.          16 A. "This lack of association was          17 consistent for both exposure metrics", that is what          18 it says.          19 MS. GREENWALD: That's not a full          20 sentence, by the way. That's only part of the          21 sentence.          22 Q. Let's take -- I will be going through          23 the entire sentence, believe me, but I want to take          24 this in steps. Let's take a look at the rate ratios          25 in this study for non-Hodgkin's lymphoma that are</p>
<p style="text-align: right;">22</p> <p>1 within the document, that talk about limitations on          2 this interpretation, so that simple sentence does          3 not give a good interpretation of the overall paper.          4 Q. Do you disagree with the conclusions          5 set forth in the abstract of this 2018 National          6 Cancer Institute journal study that no association          7 was apparent between glyphosate and non-Hodgkin's          8 lymphoma and its subtypes?          9 A. I would agree to the statement that          10 given the analyses they did, given the limitations          11 they saw, and -- the bottom line from their analyses          12 is they saw nothing. That's not an interpretation,          13 that is a statement of fact of how they evaluated          14 and analyzed the data.          15 Q. And this statement of the study          16 findings was accepted by the Journal of the National          17 Cancer Institute after independent peer review,          18 correct?          19 MS. GREENWALD: Objection, form.          20 A. I assume it was. I can't be certain.          21 But they peer review everything, so I would be          22 surprised if it was not.          23 Q. If you go to page 7 of the study, the          24 left-hand column, first -- beginning full paragraph,          25 "In our study", do you see that?</p>	<p style="text-align: right;">24</p> <p>1 reported on table 2. And I am going to put this on          2 the screen as well, so we can also see that.          3 So the findings with respect to          4 non-Hodgkin's lymphoma are set forth right here,          5 correct?          6 A. That is one of the findings for          7 non-Hodgkin's lymphoma in their broad analysis.          8 Q. And this is -- with respect to this          9 analysis, they also -- they present the rate ratios          10 for non-Hodgkin's lymphoma in the cohort among          11 individuals who were not exposed to glyphosate-based          12 herbicides, and also in four groupings of          13 individuals that were grouped based upon          14 intensity-weighted lifetime days of glyphosate use,          15 correct?          16 MS. GREENWALD: Objection, form.          17 A. This presents their analysis based          18 upon different exposure classifications where          19 40 percent of the exposure classifications are from          20 imputation, which I feel is probably leading to          21 severe misclassification, and because of that severe          22 misclassification, that is why they are seeing these          23 null results. However, they do have null results          24 here, that is clearly what they are interpreting.          25 I have a second problem with this</p>



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7 (25 to 28)

<p style="text-align: right;">25</p> <p><b>1 particular set of numbers, in that in the De Roos</b>  <b>2 paper, the analysis for dose response was against</b>  <b>3 the lowest exposure group --</b>  4 Q. And we are going to be talking about  5 that. That is exactly where I'm going --  6 MS. GREENWALD: Let him finish it, let him  7 finish his answer, please.  8 MR. LASKER: We will be asking about --  9 MS. GREENWALD: I understand that.  10 MR. LASKER: We will be asking about that,  11 but I would like to have an answer to my question,  12 and we will get to that issue, both of those issues  13 you raised --  14 MS. GREENWALD: Mr. Lasker, he has the  15 right to finish the answer to his question.  16 Q. The data for intensity-weighted  17 cumulative exposure dose response for non-Hodgkin's  18 lymphoma is presented in table 2 in the 2018  19 National Cancer Institute journal publication,  20 correct?  21 MS. GREENWALD: Objection, form.  <b>22 A. Say it again, please?</b>  23 Q. The analyses that the NIH  24 investigators and academicians conducted for a dose  25 response based upon intensity-weighted cumulative</p>	<p style="text-align: right;">27</p> <p><b>1 A. There's a very nice publication on</b>  <b>2 the intensity score which lays it all out</b>  <b>3 completely. This is a short summary of what they</b>  <b>4 wanted to say about it, but that is what it says on</b>  <b>5 the document.</b>  6 Q. Okay. And --  7 <b>A. Actually, though, it's not quite</b>  <b>8 correct.</b>  9 Q. So you disagree with the statement  10 that appears in the 2018 National Cancer Institute  11 journal in which the NIH investigators describe  12 their intensity measure?  13 MS. GREENWALD: Objection, form.  <b>14 A. The way they have written it is "the</b>  <b>15 intensity score was derived from an algorithm based</b>  <b>16 on literature-based measurements and information</b>  <b>17 provided by the applicator"; however, 37 percent of</b>  <b>18 the applicators did not fill out the second</b>  <b>19 questionnaire, and those responses were imputed. So</b>  <b>20 in fact, that statement is indeed false.</b>  21 Q. The NIH scientists, in their  22 calculation of intensity-weighted cumulative  23 exposures, reported rate ratios for each of their  24 exposure groups that was below 1.0, but not  25 statistically significant, correct, than that set</p>
<p style="text-align: right;">26</p> <p>1 exposure is set forth in table 2 of the 2018  2 National Cancer Institute journal study, correct?  3 MS. GREENWALD: Objection, form.  <b>4 A. The numerical results of that</b>  <b>5 analysis are in that table, that is correct.</b>  6 Q. Okay. And these scientists measured  7 intensity of exposure, and we can look at page 2 of  8 the publication, where they lay this out, but the  9 intensity score was based on literature-based  10 measurements, and information provided by the  11 applicator, specifically whether the participant  12 mixed or applied pesticides, repaired  13 pesticide-related equipment, used personal  14 protective equipment and application method used,  15 correct?  16 MS. GREENWALD: Objection, form. You  17 didn't read that correctly.  18 Q. I'll read it again:  19 "The intensity score was derived from an  20 algorithm based on literature-based measurements and  21 information provided by the applicator, specifically  22 whether the participant mixed or applied pesticides,  23 repaired pesticide-related equipment, used personal  24 protective equipment, and application method used."  25 Correct?</p>	<p style="text-align: right;">28</p> <p>1 forth here in this table?  2 MS. GREENWALD: Objection, form.  <b>3 A. You have lost me a little bit under</b>  <b>4 there.</b>  5 Q. I'll restate the question.  6 <b>A. Thank you.</b>  7 Q. In table 2 of the 2018 National  8 Cancer Institute journal publication, the NIH  9 investigators and academicians set forth their  10 calculations of rate ratios for each exposure group  11 to glyphosate-based herbicides and reported rate  12 ratios for each exposure group below 1.0, correct?  13 MS. GREENWALD: Objection, form.  <b>14 A. So they reported rate ratios for</b>  <b>15 quartiles of exposure against what they claim is an</b>  <b>16 unexposed group, and they have calculated for each</b>  <b>17 of those a rate ratio that is below 1. However,</b>  <b>18 I don't agree with those rate ratios.</b>  19 Q. Yes, and I am going to ask you  20 exactly about that now. So in your analysis, in  21 your supplemental expert report, you provided your  22 own different dose response analysis, correct?  <b>23 A. I provided an indication of what the</b>  <b>24 dose response analysis would have looked like had</b>  <b>25 they used the same approach as was used in the De</b></p>

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29	<p>1 <b>Roos paper.</b></p> <p>2 Q. Okay. Just so I understand what you</p> <p>3 have done, in conducting your dose response</p> <p>4 analysis, you remove the unexposed group from the</p> <p>5 analysis, correct?</p> <p>6 <b>A. Each analysis that's shown here is</b></p> <p>7 <b>a pair-wise analysis against a reference group.</b></p> <p>8 <b>They did their pair-wise analysis against the</b></p> <p>9 <b>reference group of controls. In the De Roos paper,</b></p> <p>10 <b>they argued that they did not want to use the</b></p> <p>11 <b>controls because they differed socio-economically</b></p> <p>12 <b>and demographically from the treateds, and so they</b></p> <p>13 <b>did their comparison, their referent group was the</b></p> <p>14 <b>first quartile -- first tertile. Here I made the</b></p> <p>15 <b>referent group the first quartile, so my pair-wise</b></p> <p>16 <b>pair -- comparisons are the treated groups above the</b></p> <p>17 <b>first quartile against the first quartile.</b></p> <p>18 Q. I just want to understand what your</p> <p>19 analysis is. So in your analysis, you remove the</p> <p>20 unexposed group and then you compare Q2 to Q1, Q3 to</p> <p>21 Q1 and Q4 to Q1 within the exposure groups, correct?</p> <p>22 <b>A. Correct.</b></p> <p>23 MS. GREENWALD: Objection, form.</p> <p>24 Q. In that analysis, as a result of that</p> <p>25 analysis, the numbers that are reported by the NIH</p>	31	<p>1 Q. You state, in your opinion, that</p> <p>2 through this calculation that you provide for the --</p> <p>3 for dose response, that the 2018 study shows</p> <p>4 increased rate ratios for non-Hodgkin's lymphoma</p> <p>5 relative to the lowest exposure group, correct?</p> <p>6 MS. GREENWALD: Objection, form.</p> <p>7 <b>A. That's not what the sentence says.</b></p> <p>8 Q. You state:</p> <p>9 "Thus ..."</p> <p>10 <b>A. "Thus, unlike the previous study,</b></p> <p>11 <b>this study shows increased relative risks for NHL</b></p> <p>12 <b>relative to the lowest exposure group."</b></p> <p>13 <b>I am not declaring that these are</b></p> <p>14 <b>increased relative risks, I am declaring that they</b></p> <p>15 <b>are increased relative to what was seen in the De</b></p> <p>16 <b>Roos study 2003.</b></p> <p>17 Q. I see. Is it your opinion that the</p> <p>18 2018 National Cancer Institute journal study, based</p> <p>19 upon this calculation, that removes the unexposed,</p> <p>20 shows evidence of a dose response between</p> <p>21 glyphosate-based herbicides and non-Hodgkin's</p> <p>22 lymphoma?</p> <p>23 MS. GREENWALD: Objection, form.</p> <p>24 <b>A. No, it raises concern on my part</b></p> <p>25 <b>about why they changed the analysis method, why all</b></p>
30	<p>1 investigators and academicians as being all below 1,</p> <p>2 in your calculation, those numbers are now all 1 or</p> <p>3 higher, correct?</p> <p>4 MS. GREENWALD: Objection, form.</p> <p>5 <b>A. My -- the, the -- the numbers become</b></p> <p>6 <b>greater than 1 if you use that analysis, I won't</b></p> <p>7 <b>call it my numbers, it's -- if you use that</b></p> <p>8 <b>analysis, the numbers are greater than 1.</b></p> <p>9 Q. Okay, and in your supplemental expert</p> <p>10 report, through this analysis, you state that the</p> <p>11 study shows increased rate ratios for non-Hodgkin's</p> <p>12 lymphoma relative to the lower -- to the lowest</p> <p>13 exposure group, correct?</p> <p>14 <b>A. I probably say that, it's going to be</b></p> <p>15 <b>close to that. Increased or flat.</b></p> <p>16 Q. Let's look exactly, because I don't</p> <p>17 want to put words in your mouth. Let's mark as</p> <p>18 exhibit 28-6 your supplemental expert report in this</p> <p>19 case.</p> <p>20 (Exhibit 28-6 marked for identification)</p> <p>21 Q. At page 2 of your report, about</p> <p>22 three quarters of the way down the page, you are</p> <p>23 presenting this calculation that we just discussed,</p> <p>24 correct?</p> <p>25 <b>A. Yes.</b></p>	32	<p>1 <b>of a sudden are the controls the same as the treated</b></p> <p>2 <b>groups when before they were not. There's no</b></p> <p>3 <b>mention of a comparison demographically,</b></p> <p>4 <b>socio-economically, between the controls and the</b></p> <p>5 <b>treated groups, and it makes a difference which way</b></p> <p>6 <b>you do the analysis, and that is what I am pointing</b></p> <p>7 <b>out here.</b></p> <p>8 Q. In the --</p> <p>9 <b>A. Leading to a slightly different</b></p> <p>10 <b>interpretation of the overall study as well.</b></p> <p>11 Q. In your -- well, first of all, in the</p> <p>12 dose response analysis that's set forth here in the</p> <p>13 National Cancer Institute journal study, they set</p> <p>14 forth an evaluation of trend, a P trend analysis, in</p> <p>15 support of their statement that there was no</p> <p>16 evidence of a dose response between glyphosate-based</p> <p>17 herbicide exposure and non-Hodgkin's lymphoma,</p> <p>18 correct?</p> <p>19 <b>A. Yes, they put that in there.</b></p> <p>20 Q. And that's a standard methodology in</p> <p>21 analyzing dose response, correct?</p> <p>22 MS. GREENWALD: Objection, form.</p> <p>23 <b>A. That is correct, that P value comes</b></p> <p>24 <b>from an adjusted analysis of all of the available</b></p> <p>25 <b>data. I do not have that information, hence</b></p>

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33	<p><b>1 I cannot calculate that P value. You need the</b>  <b>2 individual raw data to be able to do that.</b>  3 Q. Okay. The 2018 -- so in other  4 words -- so it's -- I'm correct then that you did  5 not calculate a P trend for your dose response  6 analysis, is that correct?  7 MS. GREENWALD: Objection, form.  <b>8 A. I cannot calculate a P trend for that</b>  <b>9 dose response analysis. All I can give you is the</b>  <b>10 raw numbers of what it would look like, but it may</b>  <b>11 not even look like that when they do the adjusted</b>  <b>12 analysis, the second or third decimal point might</b>  <b>13 change a little bit, because of that type of more</b>  <b>14 complicated analysis, but it would look</b>  <b>15 approximately like that.</b>  16 Nor am I saying here that I believe it's  17 significant, you do know that, I haven't said that  18 here.  19 Q. The 2018 National Cancer Institute  20 journal study publication also provides confidence  21 intervals for each of its estimates of rate ratio in  22 its exposure groups, correct?  23 MS. GREENWALD: Objection, form.  <b>24 A. That is correct. Again, as</b>  <b>25 I mentioned before, I cannot calculate those</b></p>	35	<p>1 Roos study which I just handed you, exhibit 28-7,  2 I believe.  <b>3 A. Table 1?</b>  4 Q. Yes. They present data on smoking  5 history in the cohort as of their period of  6 analysis, 2005, in 2005, correct?  <b>7 A. Yes, smoking history is listed here.</b>  8 Q. And they find that, as compared to --  9 for never smokers -- I am sorry, for the never  10 exposed group, there was approximately 57 percent  11 range of individuals without -- that had never  12 smoked, and for those who were exposed, there was  13 about 53 percent had never smoked, correct?  14 MS. GREENWALD: Objection, form.  <b>15 A. It's in the table, you can read the</b>  <b>16 direct -- the exact numbers, but that's</b>  <b>17 approximately correct.</b>  18 Q. If we go to the 2018 --  <b>19 A. I will point out --</b>  20 MS. GREENWALD: Mr. Lasker, you have to  21 let him answer these questions.  <b>22 A. I will point out that on page 51, in</b>  <b>23 the results section, they specifically talk about</b>  <b>24 that issue, and it says:</b>  <b>25 "This is a population with relatively low</b></p>
34	<p><b>1 confidence bounds without having the original data</b>  <b>2 and doing a much more complicated analysis like they</b>  <b>3 have done.</b>  4 Q. And you are not stating, I take it  5 then, that any of the numbers you present in your  6 supplemental expert report for your dose response  7 analysis are statistically significant above 1,  8 correct?  9 MS. GREENWALD: Objection, form.  <b>10 A. I don't know its significance above</b>  <b>11 1, that is correct.</b>  12 Q. Now, you stated that -- a couple of  13 times about the fact that in the 2005 study, the  14 authors conducted a dose response within the exposed  15 groups because the authors felt that the never  16 exposed and exposed subjects differed in terms of  17 socio-economic factors and other factors like  18 smoking, correct?  19 MS. GREENWALD: Objection, form.  <b>20 A. That's what they -- that's what De</b>  <b>21 Roos wrote in her paper.</b>  22 Q. So let's look at the De Roos 2005  23 study. This will be exhibit 28-7.  24 (Exhibit 28-7 marked for identification)  25 Q. If you look at table 1 in the 2005 De</p>	36	<p><b>1 smoking prevalence; in both the exposed and</b>  <b>2 never-exposed groups, more than half of the subjects</b>  <b>3 reported that they had never smoked. Significant</b>  <b>4 differences existed between never-exposed and</b>  <b>5 lowest-exposed subjects for all of the</b>  <b>6 characteristics in table 1. Lowest- and</b>  <b>7 higher-exposed subjects also differed on several</b>  <b>8 factors, the most notable being that higher-exposed</b>  <b>9 subjects were more likely to be commercial</b>  <b>10 applicators", etcetera.</b>  <b>11 So they state it themselves, I am not</b>  <b>12 making it up.</b>  13 Q. That wasn't where I was going,  14 Dr. Portier. If you can look at the 2018 National  15 Cancer Institute journal study?  <b>16 A. Okay.</b>  17 Q. This study also has a table 1,  18 correct?  <b>19 A. Correct.</b>  20 Q. In table 1, they provide the same  21 analysis of smoking history for individuals as of  22 the date of their analysis, correct?  23 MS. GREENWALD: Objection, form.  <b>24 A. They provide proportions of --</b>  <b>25 fractions of the population that fall into different</b></p>

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<p style="text-align: right;">37</p> <p><b>1 categories of smoking usage.</b>  <b>2 Q.</b> And at the time of their analysis for  <b>3</b> the 2018 study, as compared to the difference of 57  <b>4</b> versus 53 percent, in the earlier study, as at the  <b>5</b> time of the 2018 analysis, the group that had never  <b>6</b> used glyphosate, had never smoked, was 53 percent,  <b>7</b> 53.5 percent, and for those who had been exposed, it  <b>8</b> was in the 52 percent range, correct?  <b>9 A. 53.5 for never, 52.6 for median, for</b>  <b>10 less than the median glyphosate exposure, and what's</b>  <b>11 the last one, 52.1 for above the median glyphosate</b>  <b>12 exposure.</b>  <b>13 Q.</b> So the data, the comparison on this  <b>14</b> demographic factor had changed by the date of the  <b>15</b> 2018 analysis as compared to the 2005 analysis,  <b>16</b> hadn't it?  <b>17 MS. GREENWALD:</b> Objection, form.  <b>18 A. I can't answer the question, because</b>  <b>19 they don't -- they didn't do an analysis to tell me</b>  <b>20 if it had changed or not.</b>  <b>21 Q.</b> Were you aware of the fact that the  <b>22</b> smoking history rates for nonexposed versus exposed  <b>23</b> had changed as between the date of the 2005 paper  <b>24</b> and the date of the 2018 paper when you did your  <b>25</b> revised dose response analysis?</p>	<p style="text-align: right;">39</p> <p><b>1</b> "In our study, we observed no  <b>2</b> associations ..."  <b>3</b> The NIH investigators and academicians  <b>4</b> state, as the -- the next part of their analysis,  <b>5</b> that they observed no associations between  <b>6</b> glyphosate use and non-Hodgkin's lymphoma after --  <b>7</b> when their analyses were both unlagged and when they  <b>8</b> were lagged, correct?  <b>9 MS. GREENWALD:</b> Objection, form.  <b>10 A. I am trying to find it in this</b>  <b>11 paragraph, but I am not seeing it. Oh, there it is,</b>  <b>12 unlagged and lagged analyses:</b>  <b>13 "This lack of association was consistent</b>  <b>14 for [blah blah blah] unlagged and lagged</b>  <b>15 analyses ..."</b>  <b>16 It says that, that is correct.</b>  <b>17 Q.</b> Okay. And in your expert report,  <b>18</b> your supplemental expert report, you note that no  <b>19</b> significant increased rate ratios were seen when the  <b>20</b> investigators focused their analysis on exposures  <b>21</b> that occurred 20 years prior to non-Hodgkin's  <b>22</b> lymphoma outcome, 15 years prior to non-Hodgkin's  <b>23</b> lymphoma outcome, 10 years prior to non-Hodgkin's  <b>24</b> lymphoma or 5 years prior to non-Hodgkin's lymphoma,  <b>25</b> correct?</p>
<p style="text-align: right;">38</p> <p><b>1 MS. GREENWALD:</b> Objection, form.  <b>2 A. I don't know if it's changed. You're</b>  <b>3 stating it as if it has changed, when in fact it</b>  <b>4 might not have. There's a statistical analysis for</b>  <b>5 doing that.</b>  <b>6 Q.</b> Have you done that statistical  <b>7</b> analysis?  <b>8 A. With these numbers, with these</b>  <b>9 numbers, small differences can lead to large</b>  <b>10 differences here. And it's not just the controls</b>  <b>11 you have to look at, you have to look at the</b>  <b>12 treateds as well, and this is a comparison against</b>  <b>13 median, yes, median below and median above, as</b>  <b>14 compared to the quartiles, which is where the</b>  <b>15 analysis is.</b>  <b>16 Q.</b> Dr. Portier, did you do that  <b>17</b> analysis?  <b>18 A. I can't do that analysis. I do not</b>  <b>19 have that information. I cannot do that type of</b>  <b>20 analysis.</b>  <b>21 Q.</b> Okay. The -- going back to the  <b>22</b> findings in the 2018 National Cancer Institute  <b>23</b> journal study, and again, as set forth on page 7 of  <b>24</b> the study, that first paragraph, in the left-hand  <b>25</b> column, it starts:</p>	<p style="text-align: right;">40</p> <p><b>1 MS. GREENWALD:</b> Objection, form.  <b>2 A. I don't believe I said all of that.</b>  <b>3 Q.</b> In your expert report, on page --  <b>4 A. I always --</b>  <b>5 MS. GREENWALD:</b> Mr. Lasker, if you don't  <b>6</b> let him finish answering his questions, we are going  <b>7</b> to call the judge. You have to let him finish.  <b>8</b> He's got a right to finish his answers.  <b>9</b> I understand this is a timed deposition, but he has  <b>10</b> to answer his questions -- your questions.  <b>11 MR. LASKER:</b> Okay, and if he continues to  <b>12</b> give long answers, I am happy to talk to the  <b>13</b> judge --  <b>14 MS. GREENWALD:</b> These are not long.  <b>15 MR. LASKER:</b> I don't know who the judge is  <b>16</b> who is going to be happy to be called at 1.30 in the  <b>17</b> morning, but I am happy to call him.  <b>18 MS. GREENWALD:</b> These are not long  <b>19</b> answers.  <b>20 A. If you are going to my expert -- my</b>  <b>21 supplemental report and show me the wording, that's</b>  <b>22 fine. Otherwise I was simply going to say it was</b>  <b>23 more likely that I said they saw no significant</b>  <b>24 changes in their lagged analyses, rather than the</b>  <b>25 detailed statement for every single lagging.</b></p>



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11 (41 to 44)

41	<p>1 Q. Okay, let me look at your -- let's          2 look at your supplemental expert report.          3 <b>A. I can't find it. Is this it?</b>          4 Q. That's it. Bottom of page 1 and then          5 the top of page 2:          6 "Analyses were also done [do you see that]          7 using 5-, 10-, 15-, 20-"--          8 <b>A. Yes.</b>          9 Q. So now again, looking at what you          10 stated in your expert report, you note that no          11 significantly increased rate ratios were seen when          12 the investigators focused their analyses on          13 exposures that occurred 20 years prior to          14 non-Hodgkin's lymphoma outcome, 15 years prior to          15 non-Hodgkin's lymphoma outcome, 10 years prior to          16 non-Hodgkin's lymphoma outcome, or 5 years prior to          17 non-Hodgkin's lymphoma outcome, correct?          18 MS. GREENWALD: Objection, form.          19 <b>A. I said:</b>          20 <b>"No significantly increased RRs were seen</b>          21 <b>in these analyses although the general trend was</b>          22 <b>towards higher RRs in the exposure groups as the lag</b>          23 <b>times increased."</b>          24 <b>That's exactly what I said.</b>          25 Q. Okay. And that was exactly where</p>	43	<p>1 <b>individual person, so -- and it would be before they</b>          2 <b>got NHL.</b>          3 Q. Okay. So the latest it could be          4 would be 20 years before 2012 or 2013?          5 <b>A. No, somebody who gets -- someone who</b>          6 <b>gets an NHL in, say, 2005, then their 20-year lag,</b>          7 <b>if they were exposed completely over the period,</b>          8 <b>would have been 1985.</b>          9 Q. Okay. Okay. So the exposure period          10 for the 20-year lag would have been any time prior          11 to 1992 or 1993?          12 <b>A. It couldn't be after 1992 and 1993,</b>          13 <b>that is correct.</b>          14 Q. And for the 5-year lag, it could not          15 be after 2007 or 2008, correct?          16 <b>A. That is correct.</b>          17 Q. Okay. And what you found, or what          18 you're reporting is that the reported rate ratios,          19 while not statistically significant, were larger          20 when the investigators looked at individuals whose          21 exposures to glyphosate-based herbicides took place          22 prior to 1992 or 1993 than they -- when they looked          23 at individuals whose exposures to glyphosate-based          24 herbicides could have occurred up to the dates 2007          25 to 2008, correct?</p>
42	<p>1 I was going actually with that second part, you          2 state in your report that there was a general trend          3 towards higher rate ratios in the exposure groups as          4 the lag times increased, correct?          5 <b>A. I believe that's what it said, yes.</b>          6 Q. In other words, the reported rate          7 ratios, while not statistically significant, were          8 larger when investigators looked solely at exposures          9 to glyphosate-based herbicides that took place          10 before 1992 or 1993, than were reported when they          11 looked at exposures to glyphosate-based herbicides          12 up to 2007 or 2008, correct?          13 MS. GREENWALD: Objection, form.          14 <b>A. It's a difficult form. Basically I'm</b>          15 <b>saying that if you look at the rate ratios that</b>          16 <b>appear for the current analysis, then five-year lag,</b>          17 <b>then the 10-year lag, then the 15-year lag, then the</b>          18 <b>20-year lag, they appear to be increasing.</b>          19 Q. And so if I understand that          20 correctly, a 20-year lag, just so that we          21 understand, would be 20 years prior to -- and so          22 that, you're correct -- 20 years prior to 2012 or          23 2013 which is the last date of non-Hodgkin's          24 lymphoma?          25 <b>A. No, no, it would be for each</b></p>	44	<p>1 MS. GREENWALD: Objection, form.          2 <b>A. No, that's not what I'm saying. I am</b>          3 <b>sorry, that is not what I said.</b>          4 Q. Okay.          5 <b>A. Because you're confusing what</b>          6 <b>a lagged analysis is. A lagged analysis has a very</b>          7 <b>serious assumption in it, it assumes that no other</b>          8 <b>glyphosate exposure matters whatsoever. So</b>          9 <b>regardless of what you're seeing for other -- other</b>          10 <b>people, you're only looking at the 20-year past.</b>          11 <b>And so that assumption is a very strong assumption.</b>          12 <b>So I would never say that I believe that the 5-year</b>          13 <b>is in some way reduced from the 20-year. You do</b>          14 <b>that analysis to see if, in fact, there is something</b>          15 <b>going on with the data relative to timeframe, but</b>          16 <b>you have to recognize the fact that you're</b>          17 <b>discarding data and doing it and carrying a very</b>          18 <b>heavy assumption.</b>          19 Q. When you include in the analysis --          20 sorry, when the investigators include in their          21 analysis all the exposures up until the present day,          22 without any lagging, their rate ratios are lower          23 than when they calculate them based upon exposures          24 that go back for individuals before 1992 and 1993,          25 correct?</p>

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45	<p>1 MS. GREENWALD: Objection, form.</p> <p>2 <b>A. For their analysis, using imputed</b></p> <p>3 <b>exposures, for 40 percent of the population, that</b></p> <p>4 <b>they were looking at, where I believe their controls</b></p> <p>5 <b>are misdiagnosed, yes, they saw relative risks that</b></p> <p>6 <b>were lower when they used all the data than when</b></p> <p>7 <b>they used only the 10-year data, the 10-year lag.</b></p> <p>8 Q. Okay. That's 10-year, 5 -- let me</p> <p>9 restate the question.</p> <p>10 <b>A. 5-year, 10-year, and 20-year and</b></p> <p>11 <b>15-year, yes.</b></p> <p>12 Q. So what the NIH investigators and</p> <p>13 academicians found is that when they conducted their</p> <p>14 analyses for all exposures up to the present for</p> <p>15 glyphosate-based herbicides, they reported lower</p> <p>16 rate ratios with association to non-Hodgkin's</p> <p>17 lymphoma than when they looked at the data that was</p> <p>18 looking at exposures prior to 1992 and 1993 alone,</p> <p>19 correct?</p> <p>20 MS. GREENWALD: Objection, form.</p> <p>21 <b>A. They reported lower rate ratios that</b></p> <p>22 <b>could be entirely due to the misclassification and</b></p> <p>23 <b>potential bias from the imputation of the 40 percent</b></p> <p>24 <b>of the exposures.</b></p> <p>25 Q. The -- returning to the conclusions</p>	47
46	<p>1 of the investigators, the NIH investigators in their</p> <p>2 study, in the 2018 study, the -- and continuing</p> <p>3 along with that same sentence that we have been</p> <p>4 looking at, the next statement that the</p> <p>5 investigators make with regard to the 2018 NCI study</p> <p>6 was that there was no association between</p> <p>7 glyphosate-based herbicide exposure and</p> <p>8 non-Hodgkin's lymphoma when the rate ratios were</p> <p>9 adjusted for pesticides linked to non-Hodgkin's</p> <p>10 lymphoma in previous AHS analyses, correct?</p> <p>11 MS. GREENWALD: Objection, form.</p> <p>12 <b>A. To put the sentence together, this</b></p> <p>13 <b>lack of association was consistent after further</b></p> <p>14 <b>adjustment for pesticides linked to NHL in previous</b></p> <p>15 <b>AHS analyses, so it's consistent, it's not equal.</b></p> <p>16 Q. You agree that in assessing the</p> <p>17 glyphosate epidemiologic studies, the most</p> <p>18 reasonable comparison to make -- the most reasonable</p> <p>19 comparison is to use the most fully adjusted risk</p> <p>20 estimates, correct?</p> <p>21 <b>A. No, I don't agree with that. I do</b></p> <p>22 <b>agree, using a reasonable set of adjusted risk</b></p> <p>23 <b>estimates, where the adjustments are not for every</b></p> <p>24 <b>single variable in the data set, but for</b></p> <p>25 <b>a reasonable set of variables.</b></p>	48
47	<p>1 Q. Can I ask you to go back to your</p> <p>2 initial expert report? I can't remember, I am</p> <p>3 sorry, what that was, number. What's the number on</p> <p>4 the top of that?</p> <p>5 <b>A. 28-3.</b></p> <p>6 Q. Thank you. At page 15 of your</p> <p>7 initial expert report in this litigation, at the top</p> <p>8 of the page, you state:</p> <p>9 "As noted by both the IARC monograph 112</p> <p>10 (2015) and by Chang and Delzell (2016), when</p> <p>11 comparing studies, the most reasonable comparison is</p> <p>12 to use the most-fully-adjusted risk estimates."</p> <p>13 Is that what you state?</p> <p>14 <b>A. That's what I state, but that's not</b></p> <p>15 <b>what you asked me.</b></p> <p>16 Q. Okay, well, the record will reflect</p> <p>17 what I have asked you. Let me --</p> <p>18 <b>A. This is when I am evaluating studies</b></p> <p>19 <b>that have already been done, the best comparison is</b></p> <p>20 <b>to use their fully adjusted analyses, but I would</b></p> <p>21 <b>never do an analysis that's fully adjusted for</b></p> <p>22 <b>everything, and that's what I thought you had asked</b></p> <p>23 <b>me.</b></p> <p>24 Q. You would agree that the most likely</p> <p>25 source of confounding in the glyphosate</p>	48
48	<p>1 epidemiologic studies would be exposure to other</p> <p>2 pesticides, correct?</p> <p>3 MS. GREENWALD: Objection, form.</p> <p>4 <b>A. Confounding. Yes, I would guess that</b></p> <p>5 <b>would be the most likely source of confounding.</b></p> <p>6 Q. In your initial expert report --</p> <p>7 well, strike that, let me start -- let me back up</p> <p>8 a step.</p> <p>9 In your supplemental expert report, you</p> <p>10 state that the 2018 NCI journal study is one of the</p> <p>11 epidemiologic studies that you would consider in</p> <p>12 connection with the other epidemiologic studies as</p> <p>13 well as the other scientific evidence, correct.</p> <p>14 MS. GREENWALD: Objection, form.</p> <p>15 <b>A. In making an evaluation of causality,</b></p> <p>16 <b>I would look at all of the available data, and this</b></p> <p>17 <b>is one study amongst all the available data.</b></p> <p>18 Q. In your initial expert report, and</p> <p>19 this is also on page 15, you look at what you listed</p> <p>20 as six core epidemiologic studies, and you identify</p> <p>21 McDuffie (2001), Hardell (2002), De Roos (2003), De</p> <p>22 Roos (2005), and Eriksson (2008) and Orsi (2009),</p> <p>23 correct?</p> <p>24 <b>A. That is correct.</b></p> <p>25 Q. You note that each of them report</p>	48



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49	<p>1 odds ratios or rate ratios equal to or above 1.0, 2 and you performed a statistical analysis finding 3 that the probability of this happening was 0.016, 4 which you stated was unlikely to be due to chance, 5 correct? 6 MS. GREENWALD: Objection, form. 7 <b>A. I said it is strongly suggesting the 8 studies do not agree with an underlying PRR of 1. 9 I didn't say it's due -- it's unlikely to be due to 10 chance.</b> 11 Q. Okay. Now, with the 2018 National 12 Cancer Institute journal study, one of the six core 13 epidemiologic studies now has a rate ratio below 1, 14 correct? 15 MS. GREENWALD: Objection, form. 16 <b>A. No, these six core studies are these 17 six core studies. If I were to substitute De Roos 18 for Andreotti, or Andreotti for De Roos, then that 19 would -- well, no, that wouldn't be the case, 20 because Andreotti never gave me -- excuse me, 21 Andreotti did not give us the ever never use of 22 glyphosate calculation, so I would be using 23 a different calculation, I couldn't use the ever 24 never, so it would be negative, but it wouldn't be 25 negative as like the ever nevers.</b></p>	51	<p>1 <b>A. The De Roos 2005 study was included 2 in my core set of studies.</b> 3 Q. Am I correct in my understanding that 4 you believe that the 2005 De Roos study was 5 sufficiently reliable to include as one of the core 6 epidemiologic studies of glyphosate in non-Hodgkin's 7 lymphoma? 8 MS. GREENWALD: Objection, form. 9 <b>A. Yes.</b> 10 Q. And going back to your analysis of 11 the core studies, you are aware that two of the 12 other core studies, McDuffie and De Roos 2003, have 13 now been pooled into the North American pooled 14 project, compare study, correct? 15 <b>A. I have heard about that. I haven't 16 seen a paper on it.</b> 17 Q. Okay. Do you know whether or not the 18 fully adjusted odds ratio for the North American 19 pooled project looking at self-respondent 20 information is 0.95? 21 MS. GREENWALD: Objection, form. 22 <b>A. No. I have seen some slides that 23 have been given in a talk, I wasn't at the talks, 24 I don't remember.</b> 25 Q. Okay. The 2018 National Cancer</p>
50	<p>1 <b>So yes, but my problem is I'm not sure 2 I would do that substitution, because there is such 3 problems with the Andreotti study, that I might be 4 concerned about doing that. I have to think about 5 that, in terms of looking -- when you do 6 a meta-analysis or any type of grouped analysis with 7 this type of data, you want to make sure that they 8 are comparable studies and I am not sure Andreotti 9 is comparable anymore.</b> 10 Q. Can I break that down. First of all, 11 while there was no calculation provided in the 2018 12 National Cancer Institute journal publication 13 itself, from the data that was presented, it is 14 a pretty simple mathematical analysis to show that 15 the ever never rate ratio is below 1.0, correct? 16 MS. GREENWALD: Objection, form. 17 <b>A. The uncorrected unadjusted rate ratio 18 can be calculated from these data and that number 19 would be less than 1.</b> 20 Q. The second issue, am I correct in my 21 understanding that you do believe that the De Roos 22 2005 study is sufficiently reliable to be included 23 in your view of what are the core epidemiologic 24 studies for glyphosate? 25 MS. GREENWALD: Objection, form.</p>	52	<p>1 Institute study provides rate ratios for 2 non-Hodgkin's lymphoma and seven different subtypes, 3 correct? 4 MS. GREENWALD: Objection, form. 5 <b>A. Seven, probably of seven, but yes, 6 subtypes of NHL.</b> 7 Q. If you look at the highest exposure 8 group as reported by the NIH investigators for 9 non-Hodgkin's lymphoma and for those subtypes, seven 10 of those eight numbers, seven of those eight rate 11 ratios are below 1.0, correct? 12 MS. GREENWALD: Objection, form. 13 <b>A. Let's see. (Pause). That would not 14 be true if you're arguing that all of the exposure 15 groups for those seven are below 1. That would not 16 be correct.</b> 17 Q. That was not my question though. My 18 question was, with the highest exposure group 19 recorded -- 20 <b>A. Okay, sorry.</b> 21 Q. -- for -- in the 2018 National Cancer 22 Institute journal study, for non-Hodgkin's lymphoma, 23 and six of the seven subtypes of non-Hodgkin's 24 lymphoma, the rate ratio reported in the study is 25 below 1.0, correct?</p>

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<p style="text-align: right;">53</p> <p>1 <b>A. Yes, which is probably due to the</b>  2 <b>misclassification of exposure in the control group.</b>  3 Q. So for the seven comparisons we have,  4 the rate ratio reported for the highest exposure is  5 below 1 and for one of the rate ratios we have in  6 the highest exposure group, it's above 1, correct?  7 <b>A. It's reported to be above 1, that is</b>  8 <b>correct. Again, probably due to the exposure</b>  9 <b>misclassification of the controls.</b>  10 Q. And using the same math that you used  11 to calculate your 0.016 number, the odds of this  12 pattern happening in the 2018 NCI paper by chance is  13 about 1 in -- 1 out of 32, correct?  14 MS. GREENWALD: Objection, form.  15 <b>A. I would have to get a piece of paper</b>  16 <b>and calculate it. It's a binomial calculation. So</b>  17 <b>it's not as easy as the one I did before, because</b>  18 <b>now you've got to put in the combinatoric term at</b>  19 <b>the front end, but it could be around 1 in 32, I've</b>  20 <b>no idea, but again, that's -- my interpretation</b>  21 <b>would be that that's probably due to the exposure</b>  22 <b>misclassification of controls.</b>  23 Q. Let me ask you this in general: do  24 you believe that the 2018 National Cancer Institute  25 journal study strengthens or weakens the</p>	<p style="text-align: right;">55</p> <p>1 <b>A. No, I'm afraid I don't:</b>  2 <b>"No such comparison has been ..."</b>  3 Q. The paragraph that starts:  4 "As noted for the earlier study ..."  5 At the very end of that paragraph, you  6 talk about:  7 "... an increase in non-differential  8 exposure misclassification and reduces the RRs in  9 this study."  10 Do you see that?  11 <b>A. Yes.</b>  12 Q. What is nondifferential exposure  13 misclassification?  14 <b>A. Nondifferential exposure</b>  15 <b>misclassification means that you are placed in the</b>  16 <b>wrong exposure category but it's not -- the reason,</b>  17 <b>or the -- it's not associated with the actual</b>  18 <b>outcome. So it's nondifferential in the sense that</b>  19 <b>it's not likely to cause a bias.</b>  20 Q. In other words, if there is  21 a misclassification of exposure because there's no  22 information about disease outcome, individuals who  23 ultimately -- strike that.  24 Individuals who subsequently get  25 non-Hodgkin's lymphoma are as likely to have</p>
<p style="text-align: right;">54</p> <p>1 epidemiologic evidence in support of your opinion  2 that there is an association between  3 glyphosate-based herbicides and non-Hodgkin's  4 lymphoma?  5 MS. GREENWALD: Objection, form.  6 <b>A. I believe that the 2018 Andreotti</b>  7 <b>study has no impact on my evaluation of the</b>  8 <b>epidemiology data. It is neither good nor bad.</b>  9 <b>What was seen is almost what one would have expected</b>  10 <b>to see, because of the exposure misclassification.</b>  11 Q. Starting on page 2 of your  12 supplemental expert report, you discuss various  13 issues in the 2018 National Cancer Institute journal  14 study which you opine could have led to  15 non-differential exposure misclassification,  16 correct?  17 MS. GREENWALD: Objection, form.  18 <b>A. It's -- yes, it's too broad, as to</b>  19 <b>where we're talking about here. Page 2?</b>  20 Q. Page 2, and I think you start talking  21 about, in the middle of the page -- you start  22 talking about your critique of the 2018 study, and  23 the possibility, you state here, of an increase in  24 non-differential exposure misclassification, in the  25 middle of the page, do you see that? (Pause).</p>	<p style="text-align: right;">56</p> <p>1 misclassified exposure information as individuals  2 who don't get non-Hodgkin's lymphoma, correct?  3 MS. GREENWALD: Objection, form.  4 <b>A. Along those lines, yes. I hate to</b>  5 <b>just go with your wording, because I would like to</b>  6 <b>see it written down, that's why I hesitate. But</b>  7 <b>that's close enough.</b>  8 Q. On page -- strike that.  9 One of the differences between the cohort  10 study and the case control study is that in the case  11 control study, the subjects have knowledge of their  12 disease outcome at the time that you're obtaining,  13 if it's a questionnaire-based study, like the  14 glyphosate case control studies, at the time you're  15 obtaining exposure information, correct?  16 <b>A. That is correct.</b>  17 Q. So with a case control study, you  18 have the concern of a differential exposure  19 misclassification based on disease outcome, correct?  20 MS. GREENWALD: Objection, form.  21 <b>A. You have a possibility of recall</b>  22 <b>bias, and I really never thought about recall bias</b>  23 <b>being an exposure misclassification, but I guess it</b>  24 <b>is a differential exposure misclassification.</b>  25 Q. And that possibility of</p>

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57	<p>1 a differential exposure misclassification does not          2 exist in cohort studies, because at the time you're          3 obtaining the exposure information, the subjects          4 have no knowledge of whether they will be getting          5 non-Hodgkin's lymphoma in the future, correct?          6 MS. GREENWALD: Objection, form.          7 <b>A. In a perfectly run, well conducted,          8 with no problems of lack of participation, cohort          9 study, you would not likely see differential          10 recall -- differential exposure misclassification.</b>          11 Q. If you have differences in          12 participation in a cohort study at the time of the          13 difference, participating or not, the subjects          14 likewise don't have any knowledge of whether or not          15 they will get non-Hodgkin's lymphoma in the future,          16 correct?          17 <b>A. At the time they provide -- they          18 decide not to respond? Not -- technically, no.          19 Probably that's true for most of them, but you could          20 have a rare case where somebody got NHL but didn't          21 die of it, therefore they don't show up in the          22 registry and when they chose not to respond, they          23 knew they had NHL.</b>          24 Q. Okay. Do you have any basis to          25 believe that that was a significant issue in the AHS</p>	59	<p>1 publication also provides on page 96 the data for          2 agreement in questionnaire responses for other          3 issues including smoking, drinking and dietary          4 factors, correct?          5 <b>A. Table 3?</b>          6 Q. No, in the text actually, if you look          7 at the second column on page 96, the paragraph:          8 "We also compared responses for tobacco          9 use ..."          10 Do you see that?          11 <b>A. Yes.</b>          12 Q. And for tobacco use, they found over          13 90 percent agreement for smoking ever never, and          14 76 percent agreement for numbers of cigarettes per          15 day, correct?          16 <b>A. Correct.</b>          17 Q. And towards the bottom of that page,          18 they provide information on agreement with respect          19 to alcohol, drinks per day, 71 percent, correct?          20 <b>A. Kappa 0.63, yes.</b>          21 Q. For vegetable servings per day, they          22 had 35 percent agreement, correct?          23 <b>A. Correct.</b>          24 Q. And for fruit servings per day, they          25 had 40 -- 40 percent exact agreement, correct?</p>
58	<p>1 study?          2 <b>A. No.</b>          3 Q. The -- on page 2 of your expert          4 report, in that same paragraph we were just looking          5 at, you provide percentages of different --          6 different response rates or agreement rates for          7 glyphosate, do you see that, in the questionnaire?          8 82 percent agreement, 53 percent --          9 <b>A. That is the agreement between first          10 and second questionnaire for people in the first          11 phase of the AHS.</b>          12 Q. Okay. And that is -- those numbers          13 are taken from a study that was published with          14 a lead author of Dr. Blair, in 2002, correct?          15 <b>A. Blair 2002 is where I got that from,          16 that is correct.</b>          17 Q. Let's mark the Blair 2002 study as          18 the next in line.          19 (Exhibit 28-8 marked for identification)          20 Q. The numbers that you report for the          21 agreement in the questionnaire responses for          22 glyphosate come from tables 1 and table 2 of this          23 study, correct?          24 <b>A. I believe that is correct.</b>          25 Q. And Dr. Blair in this same</p>	60	<p>1 <b>A. That is what it says.</b>          2 Q. And epidemiologists frequently use          3 questionnaire data and questionnaire responses on          4 smoking and drinking and dietary factors in          5 conducting epidemiologic research, correct?          6 MS. GREENWALD: Objection, form.          7 <b>A. Yes, I don't know what that said,          8 I am sorry.</b>          9 Q. Okay, I'll ask you again.          10 Epidemiologists frequently use questionnaire data          11 and questionnaire responses on smoking and drinking          12 and dietary factors in conducting epidemiologic          13 research, correct?          14 MS. GREENWALD: Same objection.          15 <b>A. They would usually ask questions --          16 if you're doing an epidemiology study that is in any          17 way related to health and the environment, you would          18 typically ask about smoking, alcohol use and dietary          19 factors.</b>          20 Q. And there are numerous          21 epidemiological publications in the peer-reviewed          22 literature that look at associations of health          23 outcomes with smoking, alcohol use and dietary          24 factors based upon questionnaire responses, correct?          25 <b>A. That is correct.</b></p>

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16 (61 to 64)

<p>61</p> <p>1 Q. The AHS -- the investigators for the 2 Agricultural Health Study cohort specifically set up 3 their cohort among farmers and pesticide applicators 4 because they believed that those individuals would 5 have more reliable recall of pesticide use than the 6 general population, correct? 7 MS. GREENWALD: Objection, form. 8 <b>A. The correct term is private 9 applicators and commercial applicators, and 10 I believe that's what they said. I am a little lost 11 on the farmers issue, they keep referring to it as 12 farmers, but it's private applicators, which could 13 be different.</b> 14 Q. Can you point to any published 15 analysis that has looked at the reliability of the 16 questionnaire responses for pesticide exposures in 17 any of the glyphosate case control studies? 18 MS. GREENWALD: Objection, form. 19 <b>A. I am a little lost on what you are 20 asking me so could you please do it again?</b> 21 Q. Sure. We were just looking at 22 a publication that looked at questionnaire responses 23 and the agreement for glyphosate exposure 24 information in the Agricultural Health Study cohort 25 questionnaires, correct?</p>	<p>63</p> <p>1 <b>A. I would have to go back to my expert 2 report and dig through it, I am sorry.</b> 3 Q. In your supplemental expert report, 4 as you mentioned earlier, the Blair 2002 paper was 5 referring to the phase one questionnaires. In your 6 supplemental expert report, you state that the 7 reliability of questionnaire responses to the second 8 phase questionnaire would likely have the same 9 concordance, if you will, or agreement as for the 10 first phase questionnaire, correct? 11 MS. GREENWALD: Objection, form. 12 <b>A. I state that no such comparison has 13 been provided for the phase two evaluation, but it's 14 highly likely the same lack of agreement is present.</b> 15 Q. The second phase questionnaire was 16 administered after the administration of Roundup 17 Ready crops, correct? 18 MS. GREENWALD: Objection, form. 19 <b>A. Again, when was Roundup Ready crops 20 introduced in the United States, 198-something? 21 I don't know, I don't remember. I thought it was in 22 the middle, it was like 2002 or something like that, 23 so the follow-up for this was sort of right on top 24 of glyphosate-ready crops coming into the 25 United States, is my understanding.</b></p>
<p>62</p> <p>1 <b>A. Correct.</b> 2 Q. Can you point to any published 3 analysis that has provided similar information as to 4 the reliability of pesticide exposure responses in 5 the published glyphosate case control studies? 6 MS. GREENWALD: Objection, form. 7 <b>A. There are analyses of exposure from 8 the glyphosate case control studies where they went 9 in and looked at purchase of glyphosate by the 10 various people involved, and looked at that and how 11 it related to the recall of the exposure. But in 12 terms of going back and asking the same question of 13 the same person twice, and looking for agreement, 14 I am unaware of any in these other studies.</b> 15 Q. And the one analysis you discussed, 16 about looking at purchase records, that analysis was 17 mentioned within one of the case control studies 18 itself, correct? 19 <b>A. They actually -- I think they had 20 a separate paper on it, but it's tied to that case 21 control study, and there was another similar thing 22 but it's just mentioned in one of the other case 23 control studies.</b> 24 Q. Can you identify the separate 25 publication you believe exists?</p>	<p>64</p> <p>1 Q. Would you agree that a farmer 2 using -- well, let's take a break, we need to change 3 our media. We can do it right now. 4 THE VIDEOGRAPHER: This is the end of 5 media 1, volume I, in the video deposition of 6 Dr. Christopher Portier, going off the record at 7 12.13 pm as indicated on the video screen, thank 8 you. 9 (12.13 pm) 10 (A short break) 11 (12.22 pm) 12 THE VIDEOGRAPHER: This is the beginning 13 of media 2, volume I in the video deposition of 14 Dr. Christopher Portier. We are on the record at 15 12.22 pm as indicated on the video screen. 16 (BY MR. LASKER) 17 Q. Dr. Portier, now, farmers who grew 18 Roundup Ready crops follow some detailed weed 19 management guidelines that specify when and how 20 often each year the farmer should apply 21 glyphosate-based herbicides, correct? 22 MS. GREENWALD: Objection, form. 23 <b>A. I have no idea. It's not my 24 expertise.</b> 25 Q. Would you -- would it be fair to say</p>



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<p style="text-align: right;">65</p> <p>1 that a farmer growing Roundup Ready crops would have 2 even more reliable recall about their use of 3 Roundup® glyphosate-based herbicides than farmers 4 prior to the adoption of Roundup Ready crops? 5 MS. GREENWALD: Objection, form. 6 Q. Let me state the question again. It 7 would be fair to say that a farmer growing Roundup® 8 Ready crops would have even more reliable recall 9 about their use of Roundup or glyphosate-based 10 herbicides than farmers prior to the adoption of 11 Roundup® Ready crops. 12 MS. GREENWALD: Objection, form. 13 <b>A. Anything I said would be speculative.</b> 14 <b>It's really not my area of expertise.</b> 15 Q. Continuing with your expert report on 16 the bottom of page 2, you reference two 17 publications, one by Acquavella in 2006 and the 18 second by Blair in 2011, correct? 19 <b>A. That is correct.</b> 20 Q. And in both of these papers, the 21 investigators compare the information provided in 22 the Agricultural Health Study algorithm for 23 intensity of exposure to glyphosate and to other 24 pesticides with measures of glyphosate or other 25 pesticides in urine, correct?</p>	<p style="text-align: right;">67</p> <p>1 Q. For the Acquavella paper, now 2 Dr. Acquavella was a former employee of Monsanto, 3 he's not an Agricultural Health Study investigator, 4 correct? 5 <b>A. As far as I know, he is not part of</b> 6 <b>the Agricultural Health Study.</b> 7 Q. And in his study, he compared 8 responses to a questionnaire that his group prepared 9 to urine levels of pesticide, not answers to the 10 Agricultural Health Study questionnaire, correct? 11 MS. GREENWALD: Objection, form. 12 <b>A. I am not certain. I would have to</b> 13 <b>look at the paper again.</b> 14 Q. Okay. And one of the analyses -- 15 well, let's actually mark this as the next in line. 16 (Exhibit 28-9 marked for identification) 17 Q. One of the analyses that 18 Dr. Acquavella and his group conducted, and it is on 19 table 4 on page 72, was to group the subjects in his 20 analysis by the intensity score of exposure as 21 measured by their questionnaire, and then see how 22 the urine levels of glyphosate and the other 23 pesticides, as the case may be, tracked with those 24 intensity groupings, correct? 25 <b>A. Several things in that statement that</b></p>
<p style="text-align: right;">66</p> <p>1 <b>A. The Acquavella does a little more</b> 2 <b>than that, because they also look at taking in an</b> 3 <b>expert in occupational exposure to figure out the</b> 4 <b>exposure as well, but in essence, both papers are</b> 5 <b>looking at metabolites in urine.</b> 6 Q. Okay. And the basis for the 7 comparison in these publications is that glyphosate 8 levels in urine provide an accurate measure of the 9 actual internal glyphosate dose, correct? 10 MS. GREENWALD: Objection, form. 11 <b>A. I wouldn't say that's the basis. The</b> 12 <b>argument is that they should be in some way closely</b> 13 <b>related to each other.</b> 14 Q. Let me just restate my question. In 15 comparing the intensity score to the urine levels of 16 glyphosate to see agreement, the reason for that 17 comparison is the premise that the measure of 18 glyphosate in urine is an accurate measure of 19 internal dose, correct? 20 MS. GREENWALD: Objection, form. 21 <b>A. It's a reflection of the internal</b> 22 <b>dose, and by looking at the kappa statistic, you're</b> 23 <b>looking at whether or not there is agreement up and</b> 24 <b>down but not necessarily the exact magnitude of the</b> 25 <b>dose.</b></p>	<p style="text-align: right;">68</p> <p>1 <b>you asked me to be correct about. First of all,</b> 2 <b>they are using the Agricultural Health Study's</b> 3 <b>method for calculating exposure intensity and their</b> 4 <b>weights for exposure intensity. The questions they</b> 5 <b>asked are the same as the questions that appear in</b> 6 <b>the AHS, but it is their questionnaire, but it's the</b> 7 <b>same questions, as best I can tell.</b> 8 <b>Now, what was the last part of that?</b> 9 Q. Okay. In this table 4, what they're 10 doing is they are grouping individuals by the 11 intensity category under the AHS algorithm, and then 12 they are comparing -- for each of those intensity 13 groups, they are looking at the levels of, for our 14 purposes, glyphosate in the urine, correct? 15 MS. GREENWALD: Objection, form. 16 <b>A. Correct.</b> 17 Q. For the highest intensity score on 18 the AHS algorithm for glyphosate, those people in 19 those -- in that highest intensity group also had 20 the highest level of glyphosate detected in their 21 urine, correct? 22 <b>A. It appears that one of those people</b> 23 <b>had 230 parts -- 33 parts per billion in the urine,</b> 24 <b>and the middle groups had -- group had 66, so yes,</b> 25 <b>that seems to be the highest ever seen in any of</b></p>

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18 (69 to 72)

<p style="text-align: right;">69</p> <p>1 <b>their people.</b></p> <p>2 Q. And also by geometric mean and</p> <p>3 median, the individuals who were in the highest</p> <p>4 intensity category by the AHS -- AHS algorithm had</p> <p>5 the highest level of glyphosate detected in their</p> <p>6 urine, correct?</p> <p>7 A. <b>No, they -- the mean of the</b></p> <p>8 <b>glyphosate levels in people in the highest dose</b></p> <p>9 <b>group, highest intensity category, is higher than</b></p> <p>10 <b>the mean from the other two categories.</b></p> <p>11 Q. Okay. So there were both a higher</p> <p>12 median and a higher mean glyphosate levels in urine</p> <p>13 for the individuals who were in the AHS highest</p> <p>14 intensity score group, correct?</p> <p>15 MS. GREENWALD: Objection, form.</p> <p>16 A. <b>There were the highest median and the</b></p> <p>17 <b>highest mean in the highest intensity category, that</b></p> <p>18 <b>is correct.</b></p> <p>19 Q. Dr. Acquavella, at page 73 of his</p> <p>20 publication, stated -- and this is in his second</p> <p>21 column, about two thirds of the way down, you see</p> <p>22 the sentence that starts:</p> <p>23 "The average exposure intensity algorithm</p> <p>24 proposed by Dosemeci and colleagues ..."</p> <p>25 And that's referring to the AHS intensity</p>	<p style="text-align: right;">71</p> <p>1 algorithm based upon findings of urine levels and</p> <p>2 these correlations with the intensity -- with the</p> <p>3 intensity score, correct?</p> <p>4 A. <b>They did modify it. I am not sure --</b></p> <p>5 <b>I remember the reasoning for doing the modification</b></p> <p>6 <b>but between phase one and phase two, they modified</b></p> <p>7 <b>the intensity score measures, weights.</b></p> <p>8 Q. And Dr. Acquavella and his group also</p> <p>9 concluded that the dose -- a dose response analysis</p> <p>10 based instead solely on days of exposure could have</p> <p>11 substantial exposure misclassification, correct?</p> <p>12 MS. GREENWALD: Objection, form.</p> <p>13 A. <b>So that presumes -- I am sorry it's</b></p> <p>14 <b>taking me a little while. It presumes that the</b></p> <p>15 <b>total amount of exposure you get is the thing that's</b></p> <p>16 <b>most important in causing the disease. And that's</b></p> <p>17 <b>a pure assumption. If it's number of repeats every</b></p> <p>18 <b>day of the -- of an exposure, that leads to getting</b></p> <p>19 <b>the disease, then the days of exposure would</b></p> <p>20 <b>probably be a better exposure measure than</b></p> <p>21 <b>intensity.</b></p> <p>22 <b>For most epidemiologists, they would argue</b></p> <p>23 <b>the intensity measure is probably a better measure.</b></p> <p>24 Q. The second paper by Dr. Blair and</p> <p>25 others in 2011 were conducting a similar analysis</p>
<p style="text-align: right;">70</p> <p>1 algorithm, correct?</p> <p>2 A. <b>I am aware of the paper, yes.</b></p> <p>3 Q. "The average exposure intensity</p> <p>4 algorithm proposed by Dosemeci and colleagues is an</p> <p>5 important step (sic) toward improving exposure</p> <p>6 assessment for epidemiologic studies."</p> <p>7 Correct?</p> <p>8 MS. GREENWALD: Objection, form.</p> <p>9 A. <b>"Is an important start", not "step".</b></p> <p>10 Q. "... an important start toward</p> <p>11 improving exposure assessment ..."</p> <p>12 A. <b>They go on to say:</b></p> <p>13 <b>"The ability to estimate average exposure</b></p> <p>14 <b>intensity would provide a basis for improved</b></p> <p>15 <b>dose-response analysis. However [then it says] this</b></p> <p>16 <b>algorithm (and indeed any generic approach to</b></p> <p>17 <b>exposure prediction that is based on passive</b></p> <p>18 <b>dosimetry) is limited because it ignores important</b></p> <p>19 <b>pesticide specific physical/chemical properties that</b></p> <p>20 <b>can greatly influence dose such as dermal</b></p> <p>21 <b>penetration and vapor pressure."</b></p> <p>22 So they are cautious in what they're</p> <p>23 saying about what this means.</p> <p>24 Q. And the Agricultural Health Study</p> <p>25 investigators in fact modified their intensity</p>	<p style="text-align: right;">72</p> <p>1 but they were using questionnaires that were devised</p> <p>2 and propounded by the AHS investigators, correct?</p> <p>3 MS. GREENWALD: Objection, form.</p> <p>4 A. <b>They were doing their analysis based</b></p> <p>5 <b>on the AHS response, so yes, they were using -- they</b></p> <p>6 <b>took a subset of -- if I remember correctly, they</b></p> <p>7 <b>took a subset of the AHS population, a very small</b></p> <p>8 <b>subset, and did urine biomarkers on them, and then</b></p> <p>9 <b>compared their intensity responses with that.</b></p> <p>10 Q. Okay. And then --</p> <p>11 A. <b>They also went on to demonstrate what</b></p> <p>12 <b>that means in terms of exposure misclassification.</b></p> <p>13 Q. And we are going to discuss both of</p> <p>14 those things. Let me mark the paper first, as</p> <p>15 exhibit 28-10.</p> <p>16 (Exhibit 28-10 marked for identification)</p> <p>17 Q. Dr. Blair and his coauthors, they</p> <p>18 looked at chloropyrifos and they looked at 2,4-D,</p> <p>19 they didn't look at glyphosate, correct?</p> <p>20 A. <b>That is correct.</b></p> <p>21 Q. For their analyses, in the abstract</p> <p>22 and the conclusions, they state, and we'll talk</p> <p>23 about the second part of their analysis as well in</p> <p>24 some detail, but they state that correlations</p> <p>25 between algorithm scores and urinary levels were</p>



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19 (73 to 76)

73	<p>1 "quite good", correct?</p> <p>2 MS. GREENWALD: Objection, form, that's</p> <p>3 really read out of context.</p> <p>4 <b>A. The whole sentence reads:</b></p> <p>5 <b>"Although correlations between algorithm</b></p> <p>6 <b>scores and urinary levels were quite good (i.e.</b></p> <p>7 <b>correlations between 0.4 and 0.8) exposure</b></p> <p>8 <b>misclassification would still bias relative risk</b></p> <p>9 <b>estimates in the AHS towards the null and diminish</b></p> <p>10 <b>study power."</b></p> <p>11 Q. I understand. That second part,</p> <p>12 we're going to talk about, that's your concern,</p> <p>13 about the 2018 NCI study, correct?</p> <p>14 MS. GREENWALD: Objection, form.</p> <p>15 <b>A. Part of my concern about the 2018</b></p> <p>16 <b>epidemiology study, there is a second concern</b></p> <p>17 <b>dealing with the imputation.</b></p> <p>18 Q. Okay. But for the first part of</p> <p>19 their analysis, the -- Dr. Blair and his coauthors</p> <p>20 concluded that the correlation between algorithm</p> <p>21 scores and urinary levels were quite good, correct?</p> <p>22 MS. GREENWALD: Objection, form.</p> <p>23 <b>A. It's what they said. Now, I don't</b></p> <p>24 <b>know that a 0.4 correlation, I would characterize as</b></p> <p>25 <b>quite good, but I don't do as much epidemiology data</b></p>	75
74	<p>1 <b>as they do, so in the context of epidemiology data,</b></p> <p>2 <b>it might be quite good. In the context of animal</b></p> <p>3 <b>data, it would not be.</b></p> <p>4 Q. Okay. And Dr. Blair and his</p> <p>5 coinvestigators at NIH also concluded that the</p> <p>6 algorithm -- the intensity algorithm used in the AHS</p> <p>7 provided better measures of exposure than simple</p> <p>8 measures of duration of use, correct?</p> <p>9 MS. GREENWALD: Objection, form.</p> <p>10 <b>A. I would assume that they have</b></p> <p>11 <b>concluded that since they did not use duration of</b></p> <p>12 <b>use as one of their exposure metrics.</b></p> <p>13 Q. Just to be clear, in the 2018</p> <p>14 National Cancer Institute journal on occasion they</p> <p>15 used both, correct?</p> <p>16 <b>A. I guess they used duration. Yes,</b></p> <p>17 <b>they used both, you're right. I didn't think of it</b></p> <p>18 <b>as duration, I thought of it as more days of use and</b></p> <p>19 <b>things, whereas duration is a single period, but</b></p> <p>20 <b>anyway.</b></p> <p>21 Q. The duration of use period that --</p> <p>22 the second exposure assessment or analysis using</p> <p>23 cumulative days is the same methodology that is set</p> <p>24 forth for the Eriksson analysis, correct, for</p> <p>25 duration?</p>	76

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20 (77 to 80)

77	<p>1 Q. Okay. Ad then Dr. Blair, as you</p> <p>2 already noted, and I want to turn to this, in the</p> <p>3 2011 publication, discusses how exposure</p> <p>4 misclassification in the AHS questionnaires could</p> <p>5 lead to bias towards the null, correct?</p> <p>6 <b>A. Correct.</b></p> <p>7 Q. You discussed that in addition to</p> <p>8 this concern, you also have concerns about the</p> <p>9 imputation methodology used in the 2018 NCI study,</p> <p>10 correct?</p> <p>11 <b>A. That's correct. Are we not going to</b></p> <p>12 <b>discuss this regular risk -- relative risk analysis</b></p> <p>13 <b>that Blair did?</b></p> <p>14 Q. No, we're not.</p> <p>15 <b>A. Okay. I just want to put the paper</b></p> <p>16 <b>down.</b></p> <p>17 Q. There is a different publication from</p> <p>18 NIH investigators with the lead author of Heltshe</p> <p>19 that you discuss in your report that addresses the</p> <p>20 implication method, correct?</p> <p>21 THE VIDEOGRAPHER: Going off the record at</p> <p>22 12.40 pm.</p> <p>23 (12.40 pm)</p> <p>24 (A short break)</p> <p>25 (12.43 pm)</p>	79
78	<p>1 THE VIDEOGRAPHER: Back on the record at</p> <p>2 12.43 pm as indicated on the video screen.</p> <p>3 Q. So we had just marked the Heltshe</p> <p>4 paper, 28-11.</p> <p>5 (Exhibit 28-11 marked for identification)</p> <p>6 Q. Now, in your supplemental expert</p> <p>7 report on page 3, you note that the Heltshe paper</p> <p>8 showed -- reported lower levels of pesticide use in</p> <p>9 phase 2 among nonresponders than among cohort</p> <p>10 members who responded to the phase 2 questionnaire,</p> <p>11 correct?</p> <p>12 <b>A. The prevalence in respondents was</b></p> <p>13 <b>53 percent, 52.7 percent, whereas nonrespondents,</b></p> <p>14 <b>it's estimated to be 45.2 percent.</b></p> <p>15 Q. Okay. And you state in your report</p> <p>16 that this suggests either a systemic -- systematic</p> <p>17 bias toward imputing no exposure, or that there is</p> <p>18 some aspect of nonresponse that is correlated with</p> <p>19 cohort members having less exposure during this</p> <p>20 period, correct?</p> <p>21 <b>A. Well, there's more to the systematic</b></p> <p>22 <b>bias here issue, because I also discuss the fact</b></p> <p>23 <b>that 38 of the -- 33 of the 38 pesticide they</b></p> <p>24 <b>evaluated had smaller values for prevalence use from</b></p> <p>25 <b>those respondents versus nonrespondents, and I also</b></p>	80
79	<p>1 <b>noted in table 1 that in the prediction of the</b></p> <p>2 <b>20 percent they took out -- no, that's table 3, that</b></p> <p>3 <b>there's a serious underprediction.</b></p> <p>4 Q. Now, the -- so what you're pointing</p> <p>5 out is that there's lower levels of glyphosate</p> <p>6 exposure in the nonresponders in this imputation</p> <p>7 analysis than there are in the responders, correct?</p> <p>8 <b>A. The imputed exposures in the</b></p> <p>9 <b>nonresponders are lower than the exposures in the</b></p> <p>10 <b>respondents.</b></p> <p>11 Q. Now, the AHS investigators compared,</p> <p>12 in a separate publication, responders and</p> <p>13 nonresponders to the second phase questionnaire to</p> <p>14 assess any differences in these populations,</p> <p>15 correct?</p> <p>16 MS. GREENWALD: Objection, form.</p> <p>17 <b>A. Which publication are you talking</b></p> <p>18 <b>about?</b></p> <p>19 Q. It is Montgomery 2010, and why don't</p> <p>20 we take a look at that now. We'll mark that as</p> <p>21 28-12.</p> <p>22 (Exhibit 28-12 marked for identification)</p> <p>23 Q. If you look at -- and this Montgomery</p> <p>24 2010 paper is comparing the -- nonparticipants and</p> <p>25 participants in the second phase questionnaire,</p>	80
80	<p>1 correct?</p> <p>2 <b>A. I am sorry, say it again, please?</b></p> <p>3 Q. The Montgomery 2010 paper is</p> <p>4 comparing respondents and nonrespondents to the</p> <p>5 second phase questionnaire, correct?</p> <p>6 <b>A. Comparing the responses from the</b></p> <p>7 <b>nonresponders and the responders given in phase 1 to</b></p> <p>8 <b>whether any of that links to them not responding to</b></p> <p>9 <b>phase 2.</b></p> <p>10 Q. Right, okay. And in their</p> <p>11 comparison, and you can turn to page 493, the</p> <p>12 left-hand column, you see on the left the first</p> <p>13 paragraph, full paragraph that starts "applicators",</p> <p>14 do you see that?</p> <p>15 <b>A. Yes.</b></p> <p>16 Q. The NIH investigators found that</p> <p>17 applicators were more likely not to participate, and</p> <p>18 this is referring to the phase 2 questionnaire, if</p> <p>19 they had never mixed or applied pesticides or if</p> <p>20 they personally applied pesticides less than one</p> <p>21 half of the time, consistent with the idea that</p> <p>22 those with more of a connection to the subject of</p> <p>23 the study would be more likely to participate,</p> <p>24 correct?</p> <p>25 <b>A. That's what it says, and they're not</b></p>	80

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21 (81 to 84)

<p style="text-align: right;">81</p> <p><b>1 all NIH researchers, are they? But that's being</b>  <b>2 repetitive.</b>  3 Q. So the imputation finding that  4 nonresponders use less pesticides in phase 2 than  5 responders is consistent with data from  6 questionnaire 1, which showed that the individuals  7 who didn't respond to the second phase questionnaire  8 were also less likely to use pesticides in phase 1,  9 correct?  10 MS. GREENWALD: Objection, form.  <b>11 A. I can't come to a conclusion of that,</b>  <b>12 unless I read the whole paper.</b>  13 Q. Okay. Had you read the Montgomery  14 2010 paper before?  <b>15 A. I had scanned it.</b>  16 Q. Did you recall this fact, that  17 individuals who responded to the second phase  18 questionnaire were more likely to have used  19 pesticides in phase 1 than individuals who had not  20 responded to the phase 2 questionnaire?  <b>21 A. I don't remember that exact sentence,</b>  <b>22 no, I am sorry, I do not. I would prefer to look at</b>  <b>23 it in terms of what the responses were to see if the</b>  <b>24 percentages are approximately the same, and that</b>  <b>25 would take me some time.</b></p>	<p style="text-align: right;">83</p> <p>1 use, the publications they reference here, of other  2 illustrations of where multiple imputation has been  3 used in epidemiological research?  <b>4 A. I looked at the NHANES III because</b>  <b>5 I used to be in charge of it.</b>  6 Q. And multiple imputation was used in  7 that study, correct?  <b>8 A. Very sparingly.</b>  9 Q. And the NIH investigators and others  10 in the Heltshe paper, the methodology they used to  11 assess the imputation was to take the individuals  12 who had responded to phase 1 and phase 2, and then  13 they took a random sample of 20 percent of them, put  14 them aside, pretended, if you will, that they had  15 not responded, and used their imputation method to  16 derive exposure information for those individuals,  17 and then compared those imputed figures with the  18 actual questionnaire responses for those same  19 people, correct?  20 MS. GREENWALD: Objection, form.  <b>21 A. For the 20 percent, correct.</b>  22 Q. And --  <b>23 A. It's more complicated than that,</b>  <b>24 because it's -- the imputation is four different</b>  <b>25 imputations, and it's -- algorithms are complicated.</b></p>
<p style="text-align: right;">82</p> <p>1 Q. Let's go back to Heltshe and talk  2 about the imputation methodology more generally.  3 The investigators note, the NIH and other  4 investigators note, at the beginning of the Heltshe  5 paper, in their introduction, this is on the first  6 page, in the left-hand column:  7 "Multiple imputation has been widely  8 accepted and has been used to account for missing  9 data in large national surveys and studies,  10 including NHANES III, National Assessment of  11 Educational Progress, Children's Mental Health  12 Initiative, and the Framingham Heart Study."  13 Do you see that?  <b>14 A. Yes, I do.</b>  15 Q. Do you agree in general, and we'll  16 get to the 2018 NCI study in a second, but do you  17 agree in general that multiple imputation is  18 a widely accepted methodology for use in  19 epidemiological research?  20 MS. GREENWALD: Objection, form.  <b>21 A. I am not sure I have the history in</b>  <b>22 the field sufficient to be able to say it's widely</b>  <b>23 accepted, I just don't think I can answer that</b>  <b>24 appropriately.</b>  25 Q. Okay. And have you looked at the</p>	<p style="text-align: right;">84</p> <p>1 Q. But the general approach --  <b>2 A. The general idea is what you've said.</b>  3 Q. Okay. And for overall pesticide use,  4 all pesticide use, the investigators found that,  5 through their imputation method, they calculated  6 that 85.3 percent of those cohort members had used  7 pesticides during the second phase period, and when  8 they looked at the actual questionnaire,  9 85.7 percent of those farmers had used pesticides,  10 correct?  11 MS. GREENWALD: Objection, form.  <b>12 A. This is for any pesticide?</b>  13 Q. Yes.  <b>14 A. This would be where?</b>  15 Q. It's mentioned in the abstract and  16 it's also mentioned in the "Results" section on  17 page 412.  <b>18 A. It's not in any of the tables?</b>  19 Q. It's not in the tables. So if you  20 look at the abstract, in the very beginning of the  21 paper, at the bottom --  <b>22 A. I see it, yes. That's what it says,</b>  <b>23 but of course for this -- the numbers for glyphosate</b>  <b>24 are the more important numbers.</b>  25 Q. I understand that. I'm taking this</p>

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22 (85 to 88)

85	<p>1 in steps. So for all pesticide use --</p> <p>2 <b>A. Any pesticide use.</b></p> <p>3 Q. Any pesticide use, the NIH</p> <p>4 investigators found that their imputation method</p> <p>5 matched pretty closely with the actual information</p> <p>6 for total pesticide use, 85.7 percent versus</p> <p>7 85.3 percent, correct?</p> <p>8 MS. GREENWALD: Objection, form.</p> <p>9 <b>A. That's Heltshe's paper and I would</b></p> <p>10 <b>have -- it's hard to judge. You're asking me to</b></p> <p>11 <b>make -- to say that the numbers are close, but</b></p> <p>12 <b>I would love to see standard error, and other things</b></p> <p>13 <b>associated with it, so I could do a statistical</b></p> <p>14 <b>comparison. They are three percentage points apart,</b></p> <p>15 <b>that could be enough.</b></p> <p>16 Q. 0.3 percentage points.</p> <p>17 <b>A. 0.3 --</b></p> <p>18 Q. 85.2 -- actually, yes, 85.3 --</p> <p>19 <b>A. 0.4 percent, 0.4 percent apart,</b></p> <p>20 <b>that's probably not statistically significant, but</b></p> <p>21 <b>I can't know it until I see the standard errors.</b></p> <p>22 Q. But you would agree, and you can also</p> <p>23 look, if you want to look at the standard errors on</p> <p>24 page 412, in the results section?</p> <p>25 <b>A. Results imputation assessment with</b></p>	87	<p>1 MS. GREENWALD: Objection, form.</p> <p>2 <b>A. Can you point me to that?</b></p> <p>3 Q. Sure, in the imputation methodology,</p> <p>4 right under the numbers that you just looked at, the</p> <p>5 NIH investigators state that the 85.25 percent</p> <p>6 versus 85.68 percent for any pesticide use:</p> <p>7 "... indicates that the logistic</p> <p>8 regression model underpinning the multiple</p> <p>9 imputation procedure did indeed preserve essential</p> <p>10 features of the data."</p> <p>11 Correct?</p> <p>12 MS. GREENWALD: Objection, form.</p> <p>13 <b>A. As it pertains to the prediction of</b></p> <p>14 <b>any pesticide usage, that's what it means here, but</b></p> <p>15 <b>yes, as it pertains to any pesticide usage, meaning</b></p> <p>16 <b>at least one, not just any.</b></p> <p>17 Q. And with respect to any pesticide</p> <p>18 use, you would agree with that?</p> <p>19 <b>A. Correct, it does not pertain to</b></p> <p>20 <b>glyphosate use.</b></p> <p>21 Q. I understand that.</p> <p>22 <b>A. Good.</b></p> <p>23 Q. But with respect to any pesticide</p> <p>24 use, you think that -- you agree that's a fair</p> <p>25 statement, that the multiple imputation method</p>
86	<p>1 <b>imputation adjusted standard error 0.59 percent. So</b></p> <p>2 <b>they're not statistically significant from each</b></p> <p>3 <b>other.</b></p> <p>4 Q. Okay. So for -- and I recognize this</p> <p>5 is for any pesticide use, not for glyphosate, but</p> <p>6 for any pesticide use, the Heltshe analysis showed</p> <p>7 that the imputed -- the imputation methodology</p> <p>8 worked pretty well, correct?</p> <p>9 MS. GREENWALD: Objection, form.</p> <p>10 <b>A. I would argue -- they showed they</b></p> <p>11 <b>matched the numbers up fairly well. I would argue</b></p> <p>12 <b>that with 85 percent of the people using at least</b></p> <p>13 <b>one pesticide, there's not a lot of room for</b></p> <p>14 <b>mistakes in that. So it's okay. Certainly you</b></p> <p>15 <b>wouldn't use an imputation method that didn't give</b></p> <p>16 <b>you that type of quality.</b></p> <p>17 Q. And the NIH investigators, and it's</p> <p>18 on page 412, in their discussion of those findings,</p> <p>19 with respect to any pesticide use, state that the</p> <p>20 85.7 percent versus 85.3 percent comparison:</p> <p>21 "... indicates that the logistic</p> <p>22 regression model underpinning the multiple</p> <p>23 imputation procedure did indeed preserve essential</p> <p>24 features of the data."</p> <p>25 Correct?</p>	88	<p>1 preserved the essential features of the data?</p> <p>2 MS. GREENWALD: Objection, form.</p> <p>3 <b>A. The logistic regression model</b></p> <p>4 <b>preserved the essential features of the data to get</b></p> <p>5 <b>that 85.25 percent, yes.</b></p> <p>6 Q. You agree with that?</p> <p>7 <b>A. I agree that's one interpretation of</b></p> <p>8 <b>it. My other interpretation was earlier, and that</b></p> <p>9 <b>is that they have not much leeway, if it had been</b></p> <p>10 <b>50 percent, if true was 50 percent and they were</b></p> <p>11 <b>trying to predict 50 percent, we would have a much</b></p> <p>12 <b>stronger statement because that's a difficult --</b></p> <p>13 <b>that's a more difficult prediction to make. They</b></p> <p>14 <b>also don't sort of give me an indication of what the</b></p> <p>15 <b>five imputations looked like for these five cases</b></p> <p>16 <b>that they're doing here, so it would have been nice</b></p> <p>17 <b>to see that, to get a better feel for how stable</b></p> <p>18 <b>they are, and it would have been nice to see what</b></p> <p>19 <b>the five sets of covariants were.</b></p> <p>20 <b>Now, they saw that, so they have more</b></p> <p>21 <b>knowledge than I have, so I can't easily disagree or</b></p> <p>22 <b>agree with them.</b></p> <p>23 Q. You have no basis, from anything you</p> <p>24 read in this paper, to disagree or to conclude that</p> <p>25 the NIH investigators were incorrect in stating that</p>



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89	<p>1 for any pesticide use, the multiple imputation 2 procedure preserved essential features of the data, 3 is that correct? 4 MS. GREENWALD: Objection, form. 5 <b>A. I have no reason to challenge the 6 statement as it's written in the paper, that's 7 correct. I have no data that allows me to question 8 it one way or the other for that end point.</b> 9 Q. So the -- as you noted, the Heltshe 10 investigators also looked at 38 individual 11 pesticides, including glyphosate, correct? 12 <b>A. I believe it's 38, yes.</b> 13 Q. There is no statement in the text of 14 this publication where the investigators state that 15 the imputation methodology did not work for 16 glyphosate, is there? 17 <b>A. I don't recall exactly.</b> 18 Q. Do you recall any statement in the 19 text of this publication? 20 <b>A. I would have to read the whole thing, 21 but I don't -- I don't recall that statement being 22 in there, but that doesn't mean it isn't in there.</b> 23 Q. Okay. Now, in your supplemental 24 expert report, you focus on one measurement in the 25 Heltshe paper called the Brier score, correct?</p>	91
90	<p>1 MS. GREENWALD: Objection, form. 2 <b>A. You know, in answer to your previous 3 question, can we go back to it for a second?</b> 4 Q. Sure. 5 <b>A. So you asked if there's any place in 6 here where it says that, and technically, table 3 7 says exactly that.</b> 8 Q. Okay, no, I understand your 9 interpretation of that. My question was whether or 10 not the -- 11 <b>A. What table 3 says, 52.73 percent 12 prevalence in the observed, 45.42 prevalence in the 13 predicted and the imputed with standard errors that 14 clearly make it statistically significantly 15 different between what was predicted and what was 16 observed.</b> 17 Q. Okay. I understand that, and 18 I understand, and I want to get to your analysis of 19 that. My question, though, was the investigators, 20 in their text of the paper, if they state, in any 21 place, that they believe that the imputation method 22 does not work for glyphosate? 23 MS. GREENWALD: Objection, form, and asked 24 and answered. 25 <b>A. There are 38 compounds, give or take,</b></p>	92
	<p>1 <b>in here, I don't know how many actually right now, 2 but I think it's 38, as you said, of which they 3 probably only mentioned five.</b> 4 Q. They don't mention glyphosate 5 specifically? They don't talk -- 6 <b>A. They do not mention glyphosate 7 specifically, or 33 or so of the others.</b> 8 Q. And a number of the investigators who 9 are coauthors on this Heltshe paper are also 10 coauthors on the 2018 National Cancer Institute 11 journal study of glyphosate and non-Hodgkin's 12 lymphoma, correct? 13 MS. GREENWALD: Objection, form. 14 <b>A. Some of them are. Certainly 15 Andreotti, certainly Sandler, but yes, some of them 16 are definitely in both publications.</b> 17 Q. Okay, so let's -- in your 18 supplemental expert report, you focus on one measure 19 in the Heltshe paper called the Brier score, 20 correct? 21 MS. GREENWALD: Objection, form. 22 <b>A. I discuss the Brier score, that is 23 correct.</b> 24 Q. Have you ever used the Brier score in 25 any of your own research?</p>	
	<p>1 <b>A. No, I have used something similar, 2 but not the Brier score per se.</b> 3 Q. Have you ever calculated a Brier 4 score prior to this litigation? 5 <b>A. No.</b> 6 Q. Before reviewing the Heltshe paper, 7 had you ever heard the term "Brier score"? 8 <b>A. No.</b> 9 Q. In your supplemental expert report, 10 you state that the smaller the Brier score, the more 11 accurate the imputed exposure, correct? 12 MS. GREENWALD: Objection, form. 13 <b>A. That's correct.</b> 14 Q. Where did you get that information? 15 <b>A. Directly from the publication they 16 cite for the Brier score.</b> 17 Q. Okay. Have you looked at any other 18 literature with respect to Brier scores other than 19 the Heltshe paper and what is cited in the Heltshe 20 paper at that point? 21 <b>A. Oh, you know, I do a lot of searches, 22 when I do these things. I might have looked at one 23 or two others but I can't -- I can't be certain.</b> 24 Q. Am I correct in my understanding that 25 the range of possible Brier scores is zero to 1.0?</p>	

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93	<p>1 <b>A. That is my understanding as well.</b></p> <p>2 Q. Okay. Is it your understanding that</p> <p>3 a Brier score of zero shows perfect accuracy and</p> <p>4 a Brier score of 1.0 shows the worst possible</p> <p>5 accuracy?</p> <p>6 MS. GREENWALD: Objection to form.</p> <p>7 <b>A. It's something in that range, yes.</b></p> <p>8 Q. What is the cutoff point at which you</p> <p>9 believe a Brier score indicates accuracy that would</p> <p>10 make the imputation methodology unreliable?</p> <p>11 <b>A. I don't -- they didn't do it that way</b></p> <p>12 <b>and neither do -- neither, I think, does Brier in</b></p> <p>13 <b>their scoring, they don't talk about a bright cutoff</b></p> <p>14 <b>point.</b></p> <p>15 Q. So let's take a look at table 3,</p> <p>16 where they report the individual Brier scores for</p> <p>17 each individual pesticide.</p> <p>18 <b>A. Okay.</b></p> <p>19 Q. Now there's also a calculation in</p> <p>20 this table for something called a reference Brier</p> <p>21 and something called a Brier skills score, correct?</p> <p>22 <b>A. Correct.</b></p> <p>23 Q. What is the reference Brier?</p> <p>24 <b>A. The reference Brier is a Brier score,</b></p> <p>25 <b>it's the same thing as a Brier score, but based upon</b></p>	95
94	<p>1 <b>sort of a random draw, so it's -- you're looking at</b></p> <p>2 <b>how much you can improve from the reference Brier by</b></p> <p>3 <b>doing your own predictions.</b></p> <p>4 Q. And random score, is your</p> <p>5 understanding of the reference score then, that it</p> <p>6 is just a 50/50, would be the reference score?</p> <p>7 <b>A. I don't -- I don't -- I didn't dig</b></p> <p>8 <b>into it that much, because they are only using the</b></p> <p>9 <b>reference Brier to get the Brier skill score, and</b></p> <p>10 <b>I was just more interested in the Brier score. The</b></p> <p>11 <b>Brier skill score tells you how much better you did</b></p> <p>12 <b>with your prediction than the reference Brier, but</b></p> <p>13 <b>I wanted to know how well they did with their score,</b></p> <p>14 <b>so I was looking at Brier score only.</b></p> <p>15 Q. Okay. Based upon your understanding</p> <p>16 of a Brier score then, the pesticides, for example,</p> <p>17 methyl bromide at the top and dichlorvos at the</p> <p>18 bottom, and this is in the publication, have -- the</p> <p>19 imputation methodology was most accurate for those</p> <p>20 pesticides, correct?</p> <p>21 <b>A. They discussed those pesticides</b></p> <p>22 <b>specifically in the paper, because those pesticides</b></p> <p>23 <b>were, by their definition, rare use pesticides,</b></p> <p>24 <b>under 200 people in the entire cohort using it, and</b></p> <p>25 <b>they expected the Brier scores to be small, because</b></p>	96
95	<p>1 <b>it becomes sort of a digital prediction, so it's not</b></p> <p>2 <b>surprising they are very small, and they probably</b></p> <p>3 <b>did better, but part of that is due to the small</b></p> <p>4 <b>sample size.</b></p> <p>5 Q. But according to your understanding</p> <p>6 of Brier scores, with -- given the small sample</p> <p>7 size, the imputation methodology worked best for</p> <p>8 these pesticides or very well, 0.004 for methyl</p> <p>9 bromide and for dichlorvos, correct?</p> <p>10 MS. GREENWALD: Objection, form.</p> <p>11 <b>A. In comparison, across all the</b></p> <p>12 <b>chemicals that are listed here, those had the lowest</b></p> <p>13 <b>scores. How well they do is dependent upon -- it's</b></p> <p>14 <b>to some degree dependent upon sample sizes, they</b></p> <p>15 <b>point out here, because it's a sum of squared error</b></p> <p>16 <b>but anyway, relative to the others, these are the</b></p> <p>17 <b>lowest scores.</b></p> <p>18 Q. Okay. And so relative to others, the</p> <p>19 imputation methodology worked best for methyl</p> <p>20 bromide and dichlorvos, correct?</p> <p>21 MS. GREENWALD: Objection, form.</p> <p>22 <b>A. If you are defining best as being the</b></p> <p>23 <b>lowest Brier score, that is correct.</b></p> <p>24 Q. Well, okay, that's -- I guess that</p> <p>25 sort of begs the question. Is it your</p>	96
96	<p>1 understanding, for example, based upon your</p> <p>2 understanding of Brier score, that the imputation</p> <p>3 method worked better, was more accurate for methyl</p> <p>4 bromide and dichlorvos than it was for glyphosate?</p> <p>5 MS. GREENWALD: Objection, form.</p> <p>6 <b>A. I think we're looking at the score</b></p> <p>7 <b>a little bit too simply. It's like thinking of sums</b></p> <p>8 <b>of square error in a regression analysis, and not</b></p> <p>9 <b>putting it in the context of the whole analysis.</b></p> <p>10 <b>I would say that given two data sets with</b></p> <p>11 <b>the same number of responses, and two different</b></p> <p>12 <b>Brier scores, the lower Brier score is the better</b></p> <p>13 <b>prediction than the other Brier score. But given</b></p> <p>14 <b>the diversity and the mixture of this, I would</b></p> <p>15 <b>clearly say methyl bromide is doing better than</b></p> <p>16 <b>glyphosate, that I would say without any doubt, any</b></p> <p>17 <b>doubt in my mind.</b></p> <p>18 Q. Okay. And the NIH investigators</p> <p>19 separately report how close the imputed prevalence</p> <p>20 of an individual pesticide use came to the actual</p> <p>21 prevalence of use in the holdout group, correct?</p> <p>22 MS. GREENWALD: Objection, form.</p> <p>23 <b>A. Say it again?</b></p> <p>24 Q. Okay, let me put it in context. We</p> <p>25 had earlier discussed the any pesticide use</p>	96



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<p style="text-align: right;">97</p> <p>1 analysis, and showing the prevalence in the imputed</p> <p>2 group versus the prevalence in the -- for the</p> <p>3 holdout group, the imputed prevalence versus the</p> <p>4 actual prevalence, correct?</p> <p>5 <b>A. That is correct.</b></p> <p>6 Q. And they did that same analysis,</p> <p>7 showing how close the imputed prevalence was to the</p> <p>8 actual prevalence for each of the individual</p> <p>9 pesticides, correct?</p> <p>10 <b>A. That is correct.</b></p> <p>11 Q. Okay. And that information is set</p> <p>12 forth on figure 2, correct?</p> <p>13 <b>A. And it's set forth in table 1.</b></p> <p>14 Q. Table 1, I think is actually</p> <p>15 a different comparison, that's -- that's not the</p> <p>16 holdout group comparison, correct? The numbers, the</p> <p>17 numbers are not right.</p> <p>18 <b>A. I am sorry, it's table 3 and figure</b></p> <p>19 <b>2.</b></p> <p>20 Q. Okay. So in figure 2 they provide</p> <p>21 the relative errors of the imputed prevalence to see</p> <p>22 how well imputed prevalence matches up with actual</p> <p>23 prevalence in the holdout group, correct?</p> <p>24 <b>A. That is correct, and it is</b></p> <p>25 <b>relative -- relative errors, instead of absolute</b></p>	<p style="text-align: right;">99</p> <p>1 <b>error.</b></p> <p>2 Q. Correct, but as far as relative error</p> <p>3 is concerned, comparing the imputed prevalence</p> <p>4 versus the actual prevalence, those pesticides with</p> <p>5 those very low Brier scores had the largest relative</p> <p>6 error in estimation, correct?</p> <p>7 MS. GREENWALD: Objection, form, and asked</p> <p>8 and answered.</p> <p>9 <b>A. In relative error, yes, but</b></p> <p>10 <b>I wouldn't have based -- that's -- relative error is</b></p> <p>11 <b>not what I would want to use in evaluating this</b></p> <p>12 <b>information to tell me whether the imputations</b></p> <p>13 <b>worked for glyphosate. I would want absolute error</b></p> <p>14 <b>and the standard deviations associated with the</b></p> <p>15 <b>absolute error.</b></p> <p>16 Q. And the relative error figure though</p> <p>17 is the figure that the AHS investigators set forth</p> <p>18 in their table comparing these 38 different</p> <p>19 pesticides, correct?</p> <p>20 <b>A. They put a relative error picture in</b></p> <p>21 <b>here, which shows a different disturbing problem</b></p> <p>22 <b>with the data set, but yes.</b></p> <p>23 Q. As a rule, the individual pesticides</p> <p>24 with the lowest Brier scores in fact had the highest</p> <p>25 relative error as far as imputed prevalence versus</p>
<p style="text-align: right;">98</p> <p>1 <b>errors.</b></p> <p>2 Q. Right. So they are comparing what</p> <p>3 they found in the holdout group for actual exposure</p> <p>4 and what they found in imputed exposure, and then</p> <p>5 calculating the relative error between those</p> <p>6 numbers, correct?</p> <p>7 <b>A. They are taking the prevalence seen</b></p> <p>8 <b>in the observed, subtracting the prevalence seen in</b></p> <p>9 <b>the imputed, and dividing by the prevalence seen in</b></p> <p>10 <b>the observed.</b></p> <p>11 Q. Okay. And that is a measure of</p> <p>12 how -- a statistical measure of how close the</p> <p>13 imputed is to the observed in that holdout group,</p> <p>14 correct?</p> <p>15 MS. GREENWALD: Objection, form.</p> <p>16 <b>A. It's -- it's relative to what the</b></p> <p>17 <b>actual percent exposure is.</b></p> <p>18 Q. Okay. And for the methyl bromide,</p> <p>19 methyl bromide, and dichlorvos and also coumaphos,</p> <p>20 which we -- which had very, very low Brier scores,</p> <p>21 as reported in table 3, those pesticides had the</p> <p>22 largest relative error as far as imputed prevalence</p> <p>23 versus actual prevalence for usage in phase 2,</p> <p>24 correct?</p> <p>25 <b>A. And I believe the smallest absolute</b></p>	<p style="text-align: right;">100</p> <p>1 actual prevalence of use in the phase 2</p> <p>2 questionnaires, correct?</p> <p>3 MS. GREENWALD: Objection, form.</p> <p>4 <b>A. That's because in calculating the</b></p> <p>5 <b>relative error, you were dividing by the probability</b></p> <p>6 <b>of being exposed to this thing, and those have the</b></p> <p>7 <b>lowest probabilities of being exposed, so you're</b></p> <p>8 <b>dividing the differences by those extremely low</b></p> <p>9 <b>probabilities, as compared to something like</b></p> <p>10 <b>glyphosate, where you had 50 percent probability so</b></p> <p>11 <b>you're dividing by 0.5, instead of 0.002, and so</b></p> <p>12 <b>that makes the relative error grow big for things</b></p> <p>13 <b>that have very small P values. When you look at</b></p> <p>14 <b>absolute error, it's quite a different picture.</b></p> <p>15 Q. Is it your understanding that the</p> <p>16 Brier score is calculated -- sorry, that relative</p> <p>17 error is calculated by an equation that puts the</p> <p>18 Brier score equivalent in the denominator?</p> <p>19 <b>A. This is not Brier score, this is</b></p> <p>20 <b>relative error. This is prevalence in observed</b></p> <p>21 <b>minus prevalence in predicted divided by prevalence.</b></p> <p>22 <b>That's my understanding of what this picture is.</b></p> <p>23 Q. So with respect to a Brier score</p> <p>24 then, am I correct in my understanding that as</p> <p>25 between different pesticides, you cannot simply</p>

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26 (101 to 104)

<p style="text-align: right;">101</p> <p>1 compare the numeric value of the Brier score, if 2 there is a different prevalence of use of those 3 pesticides? 4 MS. GREENWALD: Objection, form. 5 <b>A. If it's a big difference, it's</b> 6 <b>something you would be very careful about making</b> 7 <b>a comparison of, as far as I understand the Brier</b> 8 <b>score.</b> 9 Q. Okay. And in fact, the Brier scores 10 for these -- the pesticides that have the highest 11 relative error are -- well, strike that. 12 The Brier scores that had the lowest Brier 13 scores, which relate to these pesticides with high 14 relative error, when you talk about petroleum oil, 15 petroleum distillates, methyl bromide, 16 maneb/mancozeb, trichlorfon, metalaxyl, dichlorvos, 17 coumaphos and phorate -- I'll show you where that 18 is -- those all have very, very low Brier scores and 19 they have among the highest relative errors seen in 20 this study. 21 MS. GREENWALD: Objection, form. 22 <b>A. But they have among themselves the</b> 23 <b>lowest prevalence seen in this study.</b> 24 Q. Okay, but I'm correct that those 25 pesticides have the lowest Brier scores and the</p>	<p style="text-align: right;">103</p> <p>1 Q. It's right down here (indicates). 2 <b>A. Oh, I was in the wrong column.</b> 3 Q. That would make it hard. 4 <b>A. "For use of any chemicals, B =</b> 5 <b>0.1092, BRf = 0.1227, for a SS = 0.1103, an 11%</b> 6 <b>improvement in accuracy using ..."</b> 7 <b>So it's 0.1092.</b> 8 Q. All right. So if you look at 9 figure -- table 3, which you're looking at, the 10 Brier score for their any pesticide use analysis 11 where they had an 85.3 imputed prevalence versus an 12 actual prevalence of 85.7, the Brier score for that 13 analysis is higher than the Brier score for most of 14 the individual pesticide analyses that they present, 15 correct? 16 MS. GREENWALD: Objection, form. 17 <b>A. I don't know about most, but it's</b> 18 <b>certainly -- probably it is more than 50 percent.</b> 19 <b>It's higher than more than 50 percent. I would --</b> 20 <b>I would definitely say yes.</b> 21 Q. By my count, there may be six 22 individual pesticides that have Brier scores at or 23 higher than the Brier score for any pesticide use? 24 <b>A. Including glyphosate, yes. Which has</b> 25 <b>the highest Brier score.</b></p>
<p style="text-align: right;">102</p> <p>1 highest relative error as between imputed and actual 2 exposure, correct? 3 MS. GREENWALD: Objection, objection, 4 asked and answered. 5 <b>A. I answered it.</b> 6 Q. That's correct? 7 <b>A. No, I said they also have the lowest</b> 8 <b>prevalence, so yes, they have those lowest scores,</b> 9 <b>but the explanation in the paper is look at the</b> 10 <b>prevalence, it is not surprising.</b> 11 Q. In fact, the Brier scores for the -- 12 the Brier score for any pesticide use which we just 13 talked about, the 85.3 and the 85.7, the Brier score 14 for any pesticide use is higher than the Brier score 15 for almost all of the 38 individual pesticides, 16 correct? 17 MS. GREENWALD: Objection, form. 18 <b>A. Where is that Brier score? It must</b> 19 <b>be in the text somewhere.</b> 20 Q. On page 412, the first column, 21 towards the bottom: 22 "For use of any chemicals ..." 23 Do you see that? 24 <b>A. No, sorry, I am not getting -- let me</b> 25 <b>look at yours for a second.</b></p>	<p style="text-align: right;">104</p> <p>1 Q. So if the "any pesticide use" was in 2 this table, it would have one of the highest Brier 3 scores of any of the analyses, correct? 4 MS. GREENWALD: Objection, form. 5 <b>A. Yes.</b> 6 Q. And that Brier score would be for an 7 analysis in which there was a match, 8 a statistically -- a statistical match in the 9 imputation of 85.3 percent pesticide use with the 10 actual prevalence of 85.7 percent pesticide use, 11 correct? 12 MS. GREENWALD: Objection, form. 13 <b>A. I am sorry, this doesn't deal with</b> 14 <b>pesticide use. The Brier score is dealing with</b> 15 <b>frequency of use. It's measuring frequency of use,</b> 16 <b>so the two are not related. We can get perfect</b> 17 <b>agreement on prevalence and completely miss out</b> 18 <b>agreement on the magnitude of use.</b> 19 Q. And also we could have a perfect 20 match on prevalence of use between actual and 21 imputed, and a complete mismatch in the Brier score, 22 correct? 23 <b>A. I can have -- say it again, I am</b> 24 <b>sorry.</b> 25 Q. Sure. We can have a perfect match,</p>

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27 (105 to 108)

<p style="text-align: right;">105</p> <p>1 as we do for any pesticide use, we can have</p> <p>2 a perfect match for prevalence of use between the</p> <p>3 imputation and the actual, and a complete mismatch</p> <p>4 with the Brier score, correct?</p> <p>5 MS. GREENWALD: Objection to form.</p> <p>6 <b>A. That is correct. In fact, you can</b></p> <p>7 <b>also have terrible agreement on prevalence and</b></p> <p>8 <b>terrible Brier score, as is the case for glyphosate.</b></p> <p>9 Q. Okay. The -- and so in looking at</p> <p>10 the table 2 -- figure 2, I am sorry, as far as the</p> <p>11 relative error, or the agreement, if you will, for</p> <p>12 actual versus imputed pesticide use, we can see we</p> <p>13 have five pesticides that have relative errors at or</p> <p>14 above 0.2 or close to that in the positive</p> <p>15 direction, and then the others are all -- the other</p> <p>16 pesticides are all in the negative direction,</p> <p>17 correct?</p> <p>18 <b>A. That is correct.</b></p> <p>19 Q. And as far as the relative error is</p> <p>20 concerned, with respect to these 38 pesticides,</p> <p>21 glyphosate falls basically in the middle, correct?</p> <p>22 MS. GREENWALD: Objection, form.</p> <p>23 <b>A. No, it falls at the top of the bottom</b></p> <p>24 <b>third. It's in the bottom third.</b></p> <p>25 Q. With respect to how far away from</p>	<p style="text-align: right;">107</p> <p>1 <b>relative error. That suggests a systematic bias,</b></p> <p>2 <b>because it should be 50/50, if their prediction</b></p> <p>3 <b>technique was working pretty well.</b></p> <p>4 Q. Now, the AHS investigators or the NIH</p> <p>5 investigators, I guess, in their --</p> <p>6 <b>A. AHS is probably more correct.</b></p> <p>7 Q. In their abstract, at the top, at the</p> <p>8 beginning of the page, when they talk about -- we</p> <p>9 already talked about the observed and imputed</p> <p>10 prevalence of any pesticide use as 85.7 and</p> <p>11 85.3 percent respectively. They then go on to say</p> <p>12 that the distribution of prevalence in days per year</p> <p>13 of use for specific pesticides were similar across</p> <p>14 observed and imputed in the holdout sample.</p> <p>15 Do you agree with that statement?</p> <p>16 <b>A. No.</b></p> <p>17 Q. Okay. I want to talk a little bit</p> <p>18 also about the skill score, the Brier skill score.</p> <p>19 And the Brier skill score, as I understand your</p> <p>20 testimony and your understanding, is a calculation</p> <p>21 of how the degree by which the imputation method</p> <p>22 improved the derivation of exposure as compared to</p> <p>23 whatever the reference Brier is, correct?</p> <p>24 MS. GREENWALD: Objection, form.</p> <p>25 <b>A. That is correct.</b></p>
<p style="text-align: right;">106</p> <p>1 zero they are, given that we have five pesticides at</p> <p>2 the top that are on the other side of the line,</p> <p>3 correct, far from zero?</p> <p>4 <b>A. Yes.</b></p> <p>5 Q. As far as a -- with relative error of</p> <p>6 zero, zero being perfect, I'm just assuming that's</p> <p>7 correct, right? Is that -- my understanding</p> <p>8 correct?</p> <p>9 <b>A. That's my -- a relative error of zero</b></p> <p>10 <b>in this picture would be perfect. It would be an</b></p> <p>11 <b>absolute -- absolute error of zero and a relative</b></p> <p>12 <b>error of zero.</b></p> <p>13 Q. With respect then, given that we have</p> <p>14 these five that are greater than 0.2 off from 0.0</p> <p>15 and then we have the others below, glyphosate, with</p> <p>16 respect to relative error, comes in basically in the</p> <p>17 middle of these 38 pesticides, correct?</p> <p>18 MS. GREENWALD: Objection, form and asked</p> <p>19 and answered.</p> <p>20 <b>A. It does, but it's relative error, and</b></p> <p>21 <b>I believe absolute error is the more informative</b></p> <p>22 <b>issue here. The other thing about this picture that</b></p> <p>23 <b>is annoying, or surprising, is that more than</b></p> <p>24 <b>50 percent of the chemicals, in fact 90 percent or</b></p> <p>25 <b>80 percent of the chemicals, have a negative</b></p>	<p style="text-align: right;">108</p> <p>1 Q. And you sitting here today are not</p> <p>2 sure what the reference Brier refers to in this</p> <p>3 analysis?</p> <p>4 <b>A. I would need to go look at it very</b></p> <p>5 <b>carefully and re-read through it. If you would</b></p> <p>6 <b>like, I would be happy to do that.</b></p> <p>7 Q. I don't think we have time during the</p> <p>8 deposition, if you haven't done that already. But</p> <p>9 with respect to the Brier skill score, as far as how</p> <p>10 much -- how well the imputation method worked in</p> <p>11 improving the exposure information compared to the</p> <p>12 reference Brier, reference Brier, glyphosate</p> <p>13 actually performs better than, by my count, 27 of</p> <p>14 the other pesticides that are individually measured?</p> <p>15 MS. GREENWALD: Is that a question?</p> <p>16 Q. Is that correct?</p> <p>17 MS. GREENWALD: Objection, form.</p> <p>18 <b>A. I would need to count through them,</b></p> <p>19 <b>but let me take a quick look here. I will again</b></p> <p>20 <b>restate that the Brier is more informative than the</b></p> <p>21 <b>reference Brier in this case but yes, it looks like</b></p> <p>22 <b>it's got -- in this case, the score, the bigger the</b></p> <p>23 <b>score, the better, and here it's got a fairly good</b></p> <p>24 <b>size score, so yes, it's one of the better scores.</b></p> <p>25 <b>Still, it's statistically significantly different in</b></p>

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28 (109 to 112)

<p style="text-align: right;">109</p> <p><b>1 prevalence between imputed and observed.</b></p> <p>2 Q. But when -- and you don't understand,</p> <p>3 sitting here today, what -- when talking about how</p> <p>4 improved the measure is, compared to reference</p> <p>5 Brier, you don't know what the reference Brier is</p> <p>6 referring to at this point?</p> <p>7 MS. GREENWALD: Objection, form.</p> <p><b>8 A. I do not know what the -- I can't</b></p> <p><b>9 specifically tell you exactly what the reference</b></p> <p><b>10 Brier is, other than give you a feel for the fact</b></p> <p><b>11 that it's sort of against a random prediction model.</b></p> <p><b>12 The -- there's no P values here, it's not</b></p> <p><b>13 significantly changed, I don't know what this Brier</b></p> <p><b>14 skill score actually means in terms of statistical</b></p> <p><b>15 significance. I do know the prevalences are</b></p> <p><b>16 different.</b></p> <p>17 Q. Okay. When you say it's not</p> <p>18 statistically significant, you actually don't know</p> <p>19 one way or the other?</p> <p><b>20 A. There's no P values associated with</b></p> <p><b>21 it, it's just a score.</b></p> <p>22 Q. So you don't know if it's</p> <p>23 statistically significant or not, correct?</p> <p>24 MS. GREENWALD: Objection, form.</p> <p><b>25 A. I don't think anyone ever does that.</b></p>	<p style="text-align: right;">111</p> <p>1 (A short break)</p> <p>2 (1.35 pm)</p> <p>3 THE VIDEOGRAPHER: We are back on the</p> <p>4 record at 1.35 pm as indicated on the video screen.</p> <p>5 Q. Dr. Portier, I am going to hand you</p> <p>6 three documents that I have marked as exhibits</p> <p>7 28-13, 28-14 and 28-15, and these are e-mails of</p> <p>8 yours that you produced in connection with our</p> <p>9 subpoena for this deposition, correct?</p> <p>10 (Exhibit 28-13 marked for identification)</p> <p>11 (Exhibit 28-14 marked for identification)</p> <p>12 (Exhibit 28-15 marked for identification)</p> <p><b>13 A. They appear to be, yes.</b></p> <p>14 Q. Okay. And in these e-mails you are</p> <p>15 having communications respecting -- with respect to</p> <p>16 the 2018 National Cancer Institute study with three</p> <p>17 individuals, Robert Bellé, Tiffany Stecker and</p> <p>18 Martin Pigeon, correct?</p> <p>19 MS. GREENWALD: Objection, form.</p> <p><b>20 A. I am sending e-mails to these three</b></p> <p><b>21 people, yes.</b></p> <p>22 Q. Who is Martin Pigeon?</p> <p><b>23 A. He works for Corporate Europe. He</b></p> <p><b>24 is -- he wrote a book on glyphosate. He is</b></p> <p><b>25 a journalist of some type, or environmentalist.</b></p>
<p style="text-align: right;">110</p> <p><b>1 There's no statistic, there's no -- there's no</b></p> <p><b>2 probability measure associated with it, so there's</b></p> <p><b>3 no statistic to give you a P value.</b></p> <p>4 Q. Brier scores are often decomposed</p> <p>5 into three different terms, correct?</p> <p>6 MS. GREENWALD: Objection, form.</p> <p><b>7 A. I would have to go back to the</b></p> <p><b>8 original article and read it to better understand</b></p> <p><b>9 what that statement says.</b></p> <p>10 Q. Okay. Have you ever heard of the</p> <p>11 fact that Brier scores can be decomposed into</p> <p>12 measures of reliability, resolution and uncertainty?</p> <p><b>13 A. I vaguely remember reading that in</b></p> <p><b>14 the paper.</b></p> <p>15 Q. I take it you don't have sufficient</p> <p>16 expertise with Brier scores to be able to answer</p> <p>17 questions about that issue here today?</p> <p><b>18 A. That is correct.</b></p> <p>19 Q. Let's go off the record, I am going</p> <p>20 to be finishing up, but I just want to gather my</p> <p>21 thoughts, I want to find out how much time I have</p> <p>22 left.</p> <p>23 THE VIDEOGRAPHER: Ten minutes. Going off</p> <p>24 the record at 1.25 pm.</p> <p>25 (1.25 pm)</p>	<p style="text-align: right;">112</p> <p>1 Q. In this e-mail, which is marked as</p> <p>2 28-13, Martin Pigeon is referring to a lawyers'</p> <p>3 letter, do you see that?</p> <p><b>4 A. Yes, I don't know what that means.</b></p> <p>5 Q. Okay. Who is Robert -- how do you</p> <p>6 pronounce his last name?</p> <p><b>7 A. What does that mean? No idea. I am</b></p> <p><b>8 sorry.</b></p> <p>9 Q. Robert -- is it Bel-lay?</p> <p><b>10 A. Bel-lay.</b></p> <p>11 Q. Who is Robert Bellé?</p> <p><b>12 A. He says so in the letter.</b></p> <p><b>13 "I am advisor for Sandrine Le Feur</b></p> <p>14 a French deputy (LERM) which works with Nicolas</p> <p>15 Hulot fighting against glyphosate renewal in</p> <p>16 Europe."</p> <p>17 Q. In this e-mail exchange with</p> <p>18 Mr. Bellé, you set forth various issues that you had</p> <p>19 with the 2018 NCI journal study, correct?</p> <p>20 MS. GREENWALD: Objection, form.</p> <p><b>21 A. The issues I had with the 2018</b></p> <p><b>22 Andreotti study, yes.</b></p> <p>23 Q. One of the issues you note in your</p> <p>24 e-mail is the results of sensitivity analyses in</p> <p>25 that 2018 study, correct?</p>



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29 (113 to 116)

<p>113</p> <p>1 <b>A. I am sorry?</b></p> <p>2 Q. You have -- "in addition", you set</p> <p>3 forth first your dose response analysis, we already</p> <p>4 talked about that, and then you have:</p> <p>5 "In addition, in their discussion of their</p> <p>6 sensitivity analysis, page 4 ..."</p> <p>7 <b>A. Yes.</b></p> <p>8 Q. "... you can see that as they cut</p> <p>9 back on who to include the relative risk gets</p> <p>10 increasingly higher supporting an overall concern</p> <p>11 for these results."</p> <p>12 Correct?</p> <p>13 <b>A. That's what it says.</b></p> <p>14 Q. Okay. What is your understanding of</p> <p>15 the reason for sensitivity analyses in</p> <p>16 epidemiological studies?</p> <p>17 <b>A. To evaluate how sensitive the</b></p> <p>18 <b>findings are to specific assumptions or specific</b></p> <p>19 <b>ways in which you brought the data together.</b></p> <p>20 Q. And in the 2018 NCI study, they</p> <p>21 conducted sensitivity analyses to determine the</p> <p>22 extent to which any potential error -- imputation</p> <p>23 error in the -- that was used in the analysis</p> <p>24 impacted their results, correct?</p> <p>25 MS. GREENWALD: Objection, form.</p>	<p>115</p> <p>1 <b>A. I said that one, that was the second</b></p> <p>2 <b>one I talked about. So they did -- they threw out</b></p> <p>3 <b>the nonresponders, another form of dealing with</b></p> <p>4 <b>missing data. They went back to 2005.</b></p> <p>5 Q. And then they only looked at the</p> <p>6 phase 1 responses as the third one, correct?</p> <p>7 <b>A. And they only looked at the phase 1</b></p> <p>8 <b>responses, that's correct, that's the three.</b></p> <p>9 Q. What you stated to this adviser to</p> <p>10 this French government official was that the</p> <p>11 relative risks got increasingly higher in these</p> <p>12 sensitivity analyses as compared to the primary</p> <p>13 analysis, correct?</p> <p>14 <b>A. That's what I said, yes.</b></p> <p>15 Q. And you viewed that as an indication</p> <p>16 that there was a concern for the results, correct?</p> <p>17 <b>A. I don't know that I said that.</b></p> <p>18 <b>Overall concern for these results, yes.</b></p> <p>19 Q. In fact, the findings in the</p> <p>20 sensitivity analyses, and particularly when they</p> <p>21 took out the nonresponders and when they took out</p> <p>22 the second phase questionnaires, to again take out</p> <p>23 the imputed data, matched pretty closely with the</p> <p>24 primary results in the study, didn't they?</p> <p>25 MS. GREENWALD: Objection, form.</p>
<p>114</p> <p>1 <b>A. Not correct.</b></p> <p>2 Q. What sensitivity analyses are you</p> <p>3 referring to that they used in your e-mail?</p> <p>4 <b>A. The sensitivity analyses I am</b></p> <p>5 <b>referring to are sensitivity analyses that -- so</b></p> <p>6 <b>first of all, they gave one number for each of these</b></p> <p>7 <b>analyses, so it's very hard to judge from what they</b></p> <p>8 <b>have given their overall conclusions on this, but</b></p> <p>9 <b>they gave one number, high dose versus control,</b></p> <p>10 <b>where they used the exposures only from the phase</b></p> <p>11 <b>one evaluations, for the entire data set.</b></p> <p>12 <b>Second sensitivity analysis they did was</b></p> <p>13 <b>to move the NHL evaluation to 2005, still used the</b></p> <p>14 <b>imputed data and the other data during phase two,</b></p> <p>15 <b>and calculated an analysis.</b></p> <p>16 <b>The third one they did was, what was the</b></p> <p>17 <b>third one? Now I have to look at the paper.</b></p> <p>18 Q. It's page 4, I think as you note in</p> <p>19 your e-mail.</p> <p>20 <b>A. Yes. Truncated the follow-up period</b></p> <p>21 <b>to 2005, they did that one. Which one did I miss?</b></p> <p>22 Q. I believe it's when they looked at</p> <p>23 the individuals who responded to phase 1 and</p> <p>24 phase 2, and used just the actual data and did not</p> <p>25 use any data from nonresponders.</p>	<p>116</p> <p>1 <b>A. I would have to go back and look at</b></p> <p>2 <b>each number separately. Plus look at the P for</b></p> <p>3 <b>trend.</b></p> <p>4 Q. For the sensitivity analyses for</p> <p>5 where they took out the nonresponders and only</p> <p>6 looked at individuals with actual data in the first</p> <p>7 and second questionnaire, their rate ratio, the</p> <p>8 highest exposure quartile, was 0.82, as compared to,</p> <p>9 in their primary analysis, including the phase 2</p> <p>10 nonresponders, where there was a rate ratio of 0.87,</p> <p>11 correct?</p> <p>12 <b>A. I didn't see the 0.82, so could you</b></p> <p>13 <b>point me to that?</b></p> <p>14 Q. I am sorry, you are correct:</p> <p>15 "... using only exposure information</p> <p>16 reported at enrollment ..."</p> <p>17 So here for the analysis where they looked</p> <p>18 at the first phase questionnaire and the actual</p> <p>19 data, because they had actual data from all the</p> <p>20 cohort members in the first questionnaire, correct?</p> <p>21 MS. GREENWALD: Objection, form.</p> <p>22 Q. Dr. Portier, the AHS --</p> <p>23 <b>A. "... using only exposure information</b></p> <p>24 <b>reported at enrollment, the rate ratio in the</b></p> <p>25 <b>highest exposure quartile was 0.82."</b></p>

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30 (117 to 120)

<p>117</p> <p>1 Q. So that is actual data, because all 2 the 57,000 cohort members -- 3 <b>A. That is correct.</b> 4 Q. -- or 54,000, provide actual data? 5 <b>A. That is correct.</b> 6 Q. So with using actual data from the 7 phase 1 questionnaire, the rate ratio for the 8 highest exposure group was 0.82 compared to, with 9 the full analysis, 0.87, correct? 10 <b>A. Did I get this -- is this not the -- 11 is that the intensity or is that the frequency? 12 I guess that must be intensity. The P trend is 13 better, but the actual -- the relative risk of the 14 highest dose is not.</b> 15 Q. So the relative risk is essentially 16 unchanged when they looked at the answers, the 17 actual data just from the first question as compared 18 to their analysis, their full analysis, correct? 19 MS. GREENWALD: Objection, form. 20 <b>A. I am sorry?</b> 21 Q. The rate ratio for the highest 22 exposure group with their sensitivity analysis of 23 looking only at actual data in phase 1 24 questionnaire, the rate ratio was essentially 25 identical to the rate ratio in the highest exposure</p>	<p>119</p> <p>1 <b>A. It's bigger than the overall 2 analysis.</b> 3 Q. 0.9 versus 0.87? 4 <b>A. That's all it says, is higher.</b> 5 Q. So do you believe that 0.9 is 6 meaningfully different than 0.87 as far as a rate 7 ratio between those two analyses? 8 MS. GREENWALD: Objection, form. 9 <b>A. I am pretty sure it's not 10 statistically significant.</b> 11 Q. So it's not statistically 12 significantly different, correct? 13 <b>A. Correct.</b> 14 Q. So basically the same findings, when 15 they looked at just the first phase questionnaire 16 responses, or when they looked at the individuals 17 who responded to the first and second phase 18 questionnaire, as when they included the imputed 19 data, correct? 20 MS. GREENWALD: Objection, form. 21 <b>A. No, they're not the same findings. 22 It's higher. They are not statistically 23 significantly different but it is not the same 24 finding. The same finding would be 0.87.</b> 25 Q. Just to be clear, for those who</p>
<p>118</p> <p>1 group for when they looked at their full analysis, 2 including imputed data, correct? 3 MS. GREENWALD: Objection, form. 4 <b>A. This was intended to be discussed in 5 the context of the imputations.</b> 6 Q. I am still asking -- I still haven't 7 got an answer to my question. With respect to the 8 sensitivity analysis, when they only looked at 9 actual data from the first phase questionnaire, they 10 had a rate ratio that was essentially identical to 11 the rate ratio for that highest exposure group when 12 they included all the imputed information, correct? 13 MS. GREENWALD: Objection, form. 14 <b>A. It's not statistically significant, 15 that's correct.</b> 16 Q. With respect to the other sensitivity 17 analysis, where they looked at first phase 18 questionnaire and second phase questionnaire 19 responses for the 63 percent of the cohort that 20 responded to both questionnaires, they have a rate 21 ratio, again, it's a 0.9 for that highest exposure 22 group, again, not different from the finding with 23 their overall analysis when they included the 24 imputed information, correct? 25 MS. GREENWALD: Objection, form.</p>	<p>120</p> <p>1 answered the first questionnaire, if you just look 2 at the first questionnaire, that's lower than by 3 your analysis? 4 <b>A. 0.82, that's correct, but my 5 statement was in the context of the imputations.</b> 6 Q. Neither sensitivity analysis uses any 7 of the imputed data, correct? 8 <b>A. But you are comparing it against the 9 imputed data.</b> 10 Q. I understand, and both of those 11 findings, compared to findings that use imputed 12 data, have rate ratios that are not statistically 13 significant, correct? 14 <b>A. Statistically significant from one 15 and not statistically significant from the other 16 ones, probably.</b> 17 Q. So the sensitivity analysis did not 18 show any statistically significant difference when 19 the investigators did not use imputed data, correct? 20 MS. GREENWALD: Objection, form. 21 <b>A. That's correct. It's still in the 22 same ballpark.</b> 23 Q. And you also state that if, in the 24 next paragraph, or I think it's maybe two paragraphs 25 after, that if there is an individual who was -- who</p>



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31 (121 to 124)


<p>1 answered the first questionnaire, and had not used          2 glyphosate, so they were unexposed, and then did not          3 respond to the second phase questionnaire, they          4 would be designated as unexposed using the          5 imputation methodology, correct?          6 <b>A. That statement is what I wrote, that          7 statement is incorrect.</b>          8 MS. GREENWALD: Eric, your time is up.          9 MR. LASKER: I will finish up with one          10 question and I'll be done.          11 Q. Did you ever send another e-mail          12 following up to Mr. Bellé explaining to him that          13 that statement was incorrect?          14 <b>A. No. You would have it if I did.          15 I spoke with him on the phone. I don't recall if          16 I told him that or not, but I spoke with him on the          17 phone.</b>          18 Q. No more questions.          19 MS. GREENWALD: Give us just a couple of          20 minutes. I know I have one but I don't know if          21 I have more than one.          22 THE VIDEOGRAPHER: Going off the record at          23 1.48 pm.          24 (1.48 pm)          25 (A short break)</p>	121	<p>1 Q. Sitting here today, and as you did          2 your supplemental report, do you have sufficient          3 understanding of Brier scores to interpret the use          4 of those scores in the Heltshe paper which is          5 exhibit 28-11?          6 <b>A. Yes, I do. It's quite clear. You          7 don't actually need a lot of expertise in the Brier          8 scores to be able to look at this paper and say          9 glyphosate was a problem. The Brier score for          10 glyphosate is the worst, the absolute difference in          11 the prevalence for glyphosate is the worst from all          12 of these predictions. When you look at the relative          13 risks, the relative proportion responding --          14 proportions exposed, in figure 2 or whatever it was,          15 more than half of them were above or below zero.          16 All of those point to a systematic problem with the          17 estimation, and the Brier scores are just part of          18 that overall picture.</b>          19 MS. GREENWALD: I don't have any other          20 questions, thank you.          21 MR. LASKER: We are done.          22 THE VIDEOGRAPHER: In that case, this is          23 the end of media 2D and the video deposition today          24 of Dr. Christopher Portier. We are now going off          25 the record at 1.54 pm as indicated on the video</p>	123
<p>1 (1.52 pm)          2 THE VIDEOGRAPHER: We are back on the          3 record at 1.52 pm.          4 CROSS-EXAMINATION BY MS. GREENWALD:          5 Q. Dr. Portier, when Mr. Lasker was          6 asking you questions about exhibit 28-11, which is          7 the Heltshe article, towards the end of the          8 questions, he asked you the following question and          9 you gave the following answer. It is at 97/04 of          10 the realtime:          11 "Question: I take it you don't have          12 sufficient expertise with Brier scores to be able to          13 answer questions about that issue here today?          14 "Answer: That is correct."          15 So my question is: what were you referring          16 to when you answered that question "that is          17 correct"?          18 <b>A. That -- I was answering relative to          19 the discussion he was talking about, breaking Brier          20 scores into three different pieces, and discussing          21 that issue, I don't believe that's in this paper,          22 but when I went back and looked at Brier scores,          23 I didn't spend enough time looking at that to be          24 able to address that specific question related to          25 Brier scores.</b></p>	122	<p>1 screen, thank you very much.          2 (1.55 pm)          3 (Deposition concluded)          4          5          6          7          8          9          10          11          12          13          14          15          16          17          18          19          20          21          22          23          24          25</p>	124

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1 CERTIFICATE OF DEPONENT  
2 I, Dr. Christopher Portier, hereby certify that I have read  
3 the foregoing pages, numbered 1 through 126 of my  
4 deposition testimony taken in these proceedings on January  
5 12th 2018, and with the exception of the changes listed  
6 below and/or corrections, if any, find them to be a true  
7 and accurate transcription thereof.  
8  
9 Signed.....  
10 Date.....  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
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126

1 CERTIFICATE OF COURT REPORTER  
2 I, Claire Gwyneth Hill RPR MBIVR, Accredited Real-time  
3 Reporter, of Planet Depos, hereby certify that the  
4 foregoing testimony was recorded by me stenographically  
5 and thereafter transcribed by me, and that the foregoing  
6 transcript is a true and accurate verbatim record of the  
7 said testimony.  
8  
9 I further certify that I am not a relative, employee or  
10 counsel of any of the parties of the within cause, nor am  
11 I an employee or relative of any counsel for the parties,  
12 nor am I in any way interested in the outcome of the  
13 within cause.  
14  
15  
16  
17 Signed:   
18 Claire Gwyneth Hill  
19 Dated: 1/15/2018  
20  
21  
22  
23  
24  
25

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 Conducted on January 12, 2018

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