Exhibit 596

IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF NORTH CAROLINA
SOUTHERN DIVISION
CASE NO. 7:23-CV-897

IN RE:)
)
CAMP LEJEUNE WATER LITIGATION)
)
)
This document relates to:)
)
ALL CASES)
_____)

Videotaped Deposition of PAUL J. MICHAELS, M.D.
Given Remotely
August 6, 2025
8:56 a.m. PST

Reported by: Karen K. Kidwell, RMR, CRR
Job No. 7461308

Videotaped Deposition of Paul J. Michaels, M.D. held at:

Given Remotely

Pursuant to Notice, when were present on behalf of the respective parties:

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Also Present:

David Lane, Videographer

I N D E X

E X H I B I T S

E X H I B I T S (Cont'd)

REPORTER'S NOTE: All quotations from exhibits are reflected in the manner in which they were read into the record and do not necessarily indicate an exact quote from the document.

WEDNESDAY, AUGUST 6, 2025

P R O C E E D I N G S

- - -

VIDEOGRAPHER: We are now on the record. My name is David Lane, videographer for Golkow, Veritext Division. Today's date is August 6th, 2025, and our time is 8:56 a.m. Pacific time.

This remote video deposition is being held in the matter of In Re: Camp Lejeune Water Litigation. Our deponent today is Dr. Paul Michaels.

All parties to this deposition are appearing remotely and have agreed to the witness being sworn in remotely. Due to the nature of remote reporting, please pause briefly before speaking so that all parties are heard completely.

Counsel, please introduce yourselves and state whom you represent.

MS. GJONAJ: Diana Gjonaj, with Weitz & Luxenberg, for Plaintiffs -- Plaintiffs Leadership Group.

MS. HORAN: Alanna Horan. I'm here on behalf of the United States, and I'm joined by my colleague, Giovanni Antonucci.

VIDEOGRAPHER: Our court reporter today is Karen Kidwell, and will now swear in the witness.

PAUL J. MICHAELS, M.D.

having agreed to testify under penalties of perjury, testified as follows:

EXAMINATION

BY MS. HORAN:

Q. Good morning, Doctor. Could you please state your full name for the record?

A. Paul Joseph Michaels.

Q. And could you please state your address for the record?

A. It's 4000 Beach Loop Drive, in Bandon, Oregon. And it's 97411.

Q. So as I said a moment ago, my name is Alanna Horan; I'm an attorney with the Department of Justice, and I represent the United States in this matter.

I thought we might go over some ground rules to kind of start the day, but I do understand you've been deposed before. Correct?

A. That's correct.

Q. Roughly how many times have you been deposed?

A. In the last several years, or ever?
Q. Ever.
A. Over 50, 60 -- over 60 times.
Q. And have all of those 50 to 60 times been in your capacity as an expert witness, or were there times that you were a fact witness, or perhaps a litigant?
A. I was never a litigant. I was a fact witness once, about -- a little over a decade ago.
Q. And then the other 50 to 60 times you've been deposed, you were an expert witness; is that fair, other than that one fact witness?
A. That's correct.
Q. And when did you first start working as an expert witness?
A. It would have been towards the end of 2007 or early 2008.
Q. So I think -- sounds like you're well versed in deposition, but we'll go over just a couple of rules so we're on the same page.
So, as you are probably aware, the court reporter is here and is writing down everything we say, so it is all taken into the record. To make sure everything gets transcribed properly, I just ask that you answer my questions verbally, as opposed to

shaking or nodding your head. Is that fair?

A. That's fair.

Q. So far, I don't think this will be a concern, but I just ask that you speak at a reasonable pace so the court reporter can get everything down, and I'll do my best to do the same. Is that fair?

A. Yes.

Q. We are on Zoom. I understand sometimes there are some technical issues. So if you ever don't hear my -- hear my question, or you can't understand it, just please ask me or tell me that, and I will clarify the question. But if you answer a question, I'll assume that you understood it. Is that fair?

A. Yes. And I would add to that that I'm in a pretty rural location on the Oregon Coast, and sometimes my Internet may have some issues. And so if that's the case, I will immediately log back on if I lose the connection.

Q. Understood. Thank you for the heads-up, and we'll just do our best with the technology that we have available to us today.

Again, we're on Zoom. Sometimes this can be a little challenging. But I just ask that you let

me finish my question before you begin to answer, and I'll do my best to let you finish your answer before I begin speaking. Is that fair?

A. Yes.

Q. If you wish to take a break at any point, that's fine with me; I'm happy to do it. If you ask for a break while a question is pending, I just ask that you answer the question before we go on break; fair?

A. Yes.

Q. Is there any reason why you would be unable to give your most truthful and accurate testimony today?

A. No.

Q. Throughout the deposition, you may hear your attorney object to some of my questions. Unless your attorney instructs you not to answer the question, I ask that you please answer the question; fair?

A. Yes.

Q. What did you do today to prepare for your deposition?

A. You mean after submitting my report, just to prepare for this deposition?

Q. Correct.

A. I rereviewed my report. I rereviewed some of the WHO classification tumor books regarding hematopoietic tumors. I rereviewed some of the literature that I cited in my report. I rereviewed some of the other experts' reports that had been issued, that I had reviewed previously. I did an additional literature search, just looking if there was any additional data or reports that had come out since my initially submitted report.

Basically that's the extent of what I did.

Q. And do you recall what other expert reports you reviewed in preparation for your deposition today?

A. I believe Steven Bird -- I think that's his first name -- Dr. Bird, Dr. Reynolds. I -- Maslia, Morris Maslia. Dr. -- I'm not sure if I'm getting the last name correct -- Ambinder or Ambinder; one of the Department of Justice expert reports.

I think that's mostly it, that I can recall.

Q. Did you review Mr. Vidana's deposition transcript in preparation for your deposition today?

A. I reviewed parts of it, yes.

Q. Did you review any other medical records,

or anything of Mr. Vidana's, in preparation for today?

A. A few medical records with regard to -- surrounding the time of his diagnosis, but mostly I just reviewed my report where I had already summarized the medical records.

Q. And in reviewing your report, is there anything you found that -- to be incorrect or incomplete that you would like to amend today?

A. Well, one thing that I saw, I think towards the end of my report, I think I put May 12th for the first day that he was in Camp Lejeune, and I think I -- when I was looking at some of, I believe, Dr. Reynolds' data, that May 8th was used. So I wasn't sure about where I got May 12th, or if that was a typographical error or what. But I mean, I -- it doesn't change any of the substance of my opinions. So I -- I don't think it's really that important, honestly; it's just a discrepancy that I saw.

Q. Anything else?

A. Not that I can think of.

Q. You said you reviewed parts of Mr. Vidana's deposition transcript. What parts did you review?

A. Well, when I first reviewed his deposition transcript in preparation for this litigation, I reviewed the entire thing completely, from page 1 to the end. In this, going back, I wanted to look more at the specifics surrounding his time at Camp Lejeune, what he testified to again.

You know, I had mentioned quite a bit of that in my summary, in my report of his deposition transcript, but I just wanted to kind of go through it again and just make sure that everything was consistent with what I had initially written in the report, when I didn't see anything that I got wrong or that I felt like needed to change or supplement, et cetera. It was all kind of consistent with my initial reading and my initial impression of his deposition transcript.

Q. So you reviewed the specifics around his time at Camp Lejeune. That was the section of his deposition transcript that you went back and reviewed?

A. Right. When he was describing more about, you know, what he did, his day-to-day, Monday through Friday, what he did on the weekends, where he went, things like that.

Q. And you found the transcript was

consistent with what you had included in your reports, so you don't have any amendments; fair?

A. I think that's fair.

Q. Did you speak with any attorneys in preparation for your deposition today?

A. Yes.

Q. I'm not asking about the substance of your conversations, but what attorneys did you speak with -- or which attorneys, I should say.

A. Diana Gjonaj. And that was -- that was it.

Q. And for how long did you speak with Ms. Gjonaj for?

A. I think about a couple of hours over a couple of days.

Q. And was that on Zoom, over the phone? How did you communicate?

A. Predominantly Zoom.

Q. Did you have communications with anyone other than Ms. Gjonaj in preparing for your deposition today?

A. Could you repeat that? I'm sorry.

Q. Sure. Did you have any communications with anyone other than Ms. Gjonaj, the attorney, to prepare for your deposition today?

A. So the only other person is the initial attorney that I spoke with at the very beginning, I believe it was November of last year, in the Chaffin Luhana firm; I think that's their name. And that was Nicholas Farnolo. And I had just sent him an e-mail letting him know --

MS. GJONAJ: I'm just going to remind you that anything -- any substance of your communications with counsel is privileged.

THE WITNESS: Right. I had just sent him a quick e-mail regarding the date of my deposition.

BY MS. HORAN:

Q. And Nicholas Farnolo at Chaffin Luhana, is he who you were first in contact with about being an expert in this case?

A. Most recently, yes.

Q. Who was the first person to contact you about being an expert in this case? Or did you reach out to contact an attorney yourself?

A. I didn't reach out to contact anybody. Another attorney from his firm had brought up the litigation to me a couple of years ago, but nothing of any substance occurred at that point with respect to me actually being involved. It was just put on my

radar that this is something that their firm is involved with, that I may be asked at some point to review medical records or be involved with the case.

But Mr. Farnolo is the only one that I actually talked to specifically regarding this case.

Q. Do you work with Chaffin Luhana on other cases?

A. I worked with them on one prior case a few years ago.

Q. And do you have a retainer agreement with Chaffin Luhana?

A. I don't know that I have a retainer agreement with them. They -- back a few years ago, they asked me to -- maybe that's what I signed, just saying what my rate would be; but I don't actually -- like I've never -- I've never asked for a retainer, in the sense that I've never asked for money up front.

So -- I don't really understand the legalities of -- of things like that. I just know, you know, with regards to retainer, like I've never asked for money up front, I guess I should say. So if I sign something saying that, you know, "Sure I would work with you, but I'm not exclusive to work with you," I don't know if that's considered a

retainer agreement.

But, you know, that's basically the extent of what I was involved with. And it was not something saying I would work with them or that no question I would be involved in the case. So it's just kind of a -- I think they wanted to just have me available in case they needed me.

Q. Sure. Do you remember signing anything called a retainer agreement, engagement letter, contract of any sort that made you available to them? Do you recall signing a document like that?

A. I did sign a document, but again, I don't remember the name of that document, and I -- it wasn't anything where any money was exchanged. So -- and I reached out to them -- you know, another attorney asking, you know, "Hey, what's going on with this?" And they said, "Oh, we don't really know."

And that was a few years -- a couple years ago. Because when I talked to them initially about this litigation, I kind of was under the assumption that it would be occurring kind of quickly. But then I didn't hear anything --

MS. GJONAJ: Again, Dr. Michaels, I'll just remind you that you don't have to talk about the substance of your conversations

with --

THE WITNESS: Okay.

So, yeah.

MS. HORAN: Sure.

So we, Diana, just request a copy of whatever the engagement letter, retainer, whatever we want to call it, the letter that was signed or the agreement that was signed.

BY MS. HORAN:

Q. And have you ever signed any type of letter, engagement letter, whatever we want to call it, an agreement with the Plaintiffs Leadership Group specifically in regards to testifying on behalf of the Plaintiffs in this litigation?

A. I don't believe so.

Q. You said you first became aware of this litigation a couple of years ago; fair?

A. A few years ago.

Q. Do you recall how you first became aware of the litigation? Was it the attorney that you were speaking to that you spoke out a little while ago, or some other way?

A. No, I kind of keep up with the news as it relates to medicine, and I kind of started reading about it before I ever spoke with anybody about it,

or before it was brought up to me. I never reached out to anybody. But I had kind of known of what was going on for a few years before that. I've kind of heard -- read some articles back in probably the early 2000s, late 20-teens.

But -- so that's when I first heard about what was going on. But no details with respect to actual litigation, or that there were attorneys that were taking these cases, or -- or whatever, until a few years ago.

Q. And what is your assignment in this matter?

A. I don't know what you mean by "assignment."

Q. Sure. What were you asked to offer an opinion on?

A. Well, I was asked to review Mr. Vidana's medical records and whatever literature I saw appropriate with respect to the case and his medical records and to come to a conclusion, at least as likely as not, if his exposure was potentially a cause for the malignancy that he developed.

So I was asked to independently review what I -- the records and the data and come to that -- come to an opinion, and then share that

opinion with them.

I wasn't biased in -- I mean, I wasn't biased in that they said, you know, "We need you to have this opinion." They want to know -- they wanted to know what my opinion was, because there have been -- in my career, which we've already gone over, of, you know, 18 years, 17 years doing medical, you know, expert witness work, there have been lots of attorneys that know me, that I've worked with firms all over the country, where there are cases where I'm involved with that I may believe in the general causation that a particular exposure leads to a particular disease; but when it comes to case-specific material, there have been multiple times -- at least a dozen -- where I have said "I do not have the opinion that this -- in this particular patient" -- or this particular client, with respect to the attorneys -- "suffered this disease because of their exposure."

And so I think I have a reputation with the firms that I've worked with of being independent-minded and coming to my own scientific conclusions, and if that doesn't match with what they are thinking, or their initial hypothesis or theory, then I don't work with them, or maybe they decide to

not take the case, or whatever the -- whatever the facts may be.

But I was simply asked to evaluate Mr. Vidana's medical records, his deposition transcripts, and whatever scientific articles I could to supplement my opinion in that case.

Q. Sure. And you agree that it's important to analyze how a particular individual was exposed to the chemicals in order to determine whether it could have been a cause of their ailment?

MS. GJONAJ: Object to form.

THE WITNESS: Could you repeat that?

BY MS. HORAN:

Q. Sure. You agree that it's important to analyze a particular individual's interaction with the chemical in order to determine whether it would be a cause of their ailment?

MS. GJONAJ: Same objection.

THE WITNESS: Well, I would want to know everything I could about a potential person's exposure to any chemical, in order to feel comfortable -- I guess the amount of -- I guess it would depend.

But yes, you want to know what someone's exposure, particular exposure level would be, if

it's pertinent to the particular type of exposure and disease that you're dealing with. Because not all carcinogens or exposures are equal, and it depends on the amount of the exposure. It depends on the duration, the particular disease that you're talking about. There's so many variables that you have to look at when, you know, coming to form an opinion based on the weight of the evidence.

So I would say, in addition to looking at a particular person's exposure and their particular exposure -- interaction with the chemical, there are multiple other things that you would look at in that context.

BY MS. HORAN:

Q. Sure. And in preparing your expert report and opinions -- and I'm not asking about attorneys -- did anyone help you to prepare your report?

A. No.

Q. We received a bill that was produced to us that runs through February of 2025, February 1st of 2025, detailing your billable hours on the matter. Do you know what I'm referring to, that bill?

A. I believe so, yes.

Q. Since February 2025, have you done any

work on this case, except for to prepare for your deposition?

A. Not except to prepare for the deposition.

Q. What percentage of your annual income is earned from serving as an expert witness?

A. I would say -- well, it -- you know, of course it would vary, based on the year, and the cases I've worked on. But as a general average -- which is really the only way to answer that question -- I would imagine it's around 10 percent. Maybe a little less.

Q. You testified that you have been deposed roughly 50 to 60 times. How many times have you testified at a trial?

A. Six, I think. Or five. Five or six.

Q. Have you ever served as an expert witness for a defendant?

A. Yes.

Q. What defendant? To the extent you recall.

A. Philip Morris.

Q. And when was that?

A. It's ongoing. And it's been in the last four years.

Q. To the extent your opinions have been disclosed into the public sphere -- I don't know if

they have -- what are you -- what opinion are you offering in that case on behalf of Philip Morris?

A. Well, it depends on the particular patient that I'm asked about, but it's -- they've all been with respect to smoking and whether the malignancy that the particular individual has been diagnosed with was related to smoking.

And the cases where I've been involved are cases where, despite the fact that smoking is a significant risk factor for many different cancers and is a known carcinogen for many different cancers, there -- that does not mean that any individual person who is a smoker, that happens to develop a malignancy, has a smoking-related malignancy.

And so these have been cases where I've been asked about more than a dozen specific individuals that I suppose have started a lawsuit against Philip Morris, and I'm asked to review their pathology material and their medical records.

And although sometimes I've come to the conclusion that yes, smoking was the cause of this particular patient's malignancy, there have been other cases where it was my opinion that it was not.

And so that's basically the capacity that I serve in as is a -- a consultant and expert with

respect to smoking-related diseases.

Q. Other than Philip Morris, can you recall any other defendants you've done work for?

A. I don't believe so.

Q. So I'm going to -- or Dr. Michaels, do you have any -- do you have your report in front of you? Do you have any documents in front of you today?

A. I don't.

Q. Okay. So I'm going to share documents on the screen throughout the day. I have them on my desktop. And -- and I'm looking on my iPad, so I apologize if I'm kind of bouncing between the two, but the sound is better this way.

So I'll share them kind of throughout the day, if that works.

MS. HORAN: Diana, if you have any objection or want to do it differently, please speak up.

BY MS. HORAN:

Q. But I'll share them throughout the day, kind of -- I understand I'll then have control, so if you ever want me to scroll, or turn to another page or anything, just let me know, and I'm happy to do it.

A. Okay.

MS. GJONAJ: Alanna, would you also be able to put it in the chat so that we can open the documents?

MS. HORAN: Sure. Yeah, I can do that.

BY MS. HORAN:

Q. Okay, it's loading into the chat.

Okay. Dr. Michaels, do you see on your screen a document, "Jose Vidana vs. United States of America, Specific Causation, Expert Report of Paul J. Michaels, M.D."?

A. Yes.

MS. HORAN: And I'd like to mark this as Exhibit 1.

(Exhibit 1 was marked for identification.)

BY MS. HORAN:

Q. And I'm just going to scroll through it, and I'm going to ask you at the end if it's a complete copy, in your opinion.

Dr. Michaels, does this look like a complete copy of the opinions you intend to offer in this case?

A. Well, that looks like a -- a complete copy of the report that I issued on February 1st of this year, correct.

Q. Sure. And your report includes the

opinions you intend to offer in this case, correct?

A. Well, insomuch as -- as additional medical journal articles come out, they may, you know, substantiate my opinions, and then I would obviously include all of those in anything that I'm asked in relationship to my report to further elaborate on, I guess I should say, would be summarized within this report, correct.

Q. So short of the addition of new literature that comes out after your report was issued, this report is complete in terms of the opinions you intend to offer in this case?

A. Well, again, you know, my report -- I agree that my report stands for itself. But this is a 15-page report that talks about several different carcinogens. And I don't go into excruciating detail with respect to the mechanistic mechanisms of the different individual carcinogens and associated with diffuse large B-cell lymphoma or non-Hodgkin's lymphoma.

So in the respect that I may be asked about how I form these opinions and, you know, what you took into consideration in evaluating the weight of the evidence, there's not -- it would have to be hundreds of pages to go through all of the details of

what I could be asked about.

So I'm just trying to be complete in my answer, in that, you know, if someone says, or if you were to ask me, "Well, you didn't talk about the specific mechanism by which TCE or benzene causes genotoxicity with respect to free radicals and" -- no, I didn't; but I can discuss that and how that formed my opinion. I just can't include every single underlying fact with respect to carcinogenesis in a -- a report, if that makes sense.

Q. Sure. But you're not sitting here today with wholly new opinions that you're intending to offer at trial that are not included in your report; fair?

A. That's fair. I don't have wholly new opinions or -- no opinion that would contradict anything that I'm saying in my report.

Q. And on the screen right now is your signature next to a date of February 1st, 2025. Do you see that?

A. Yes.

Q. And so you completed your expert report on February 1st, 2025; fair?

A. Yes.

MS. HORAN: I'm marking as Exhibit 2 --

this is a document, with the first page "February 2025 Expert Report of Paul J. Michaels, M.D." And this says it's an "Additional Materials Considered" list.

(Exhibit 2 was marked for identification.)

BY MS. HORAN:

Q. Do you see that on your screen, Dr. Michaels?

A. Yes, I do.

Q. Okay. And I'm just going to scroll through this.

For the record, we received your original list in February, and then we've since received two additional lists, and those are amended to the back of this.

So I'll just scroll through it quickly, and I'm going to ask you at the end whether this looks like a complete list of the materials that you've reviewed.

MS. GJONAJ: If I could just mention, she's also dropped that in the chat, so if it's easier for you to scroll and look at these exhibits in the chat . . .

THE WITNESS: Okay.

BY MS. HORAN:

Q. Dr. Michaels, does this look like a complete list of the materials you relied on in forming your opinions in this case?

A. It does.

Q. I am -- I'm showing the last page right now. And do you see the top right says July 30th, 2025?

A. Yes.

Q. Under the section "Expert Materials," you have the four expert reports listed that -- all from April 8th, 2025; that of Dr. Tosic, Dr. Ambinder, Dr. LaKind, and Dr. Bailey. Do you see that?

A. Yes.

Q. And I believe you mentioned you reviewed Dr. Ambinder's report in preparation for your deposition today. Is that fair?

A. Yes.

Q. Prior to receiving Dr. Ambinder's report, did you have any knowledge of Dr. Ambinder or -- kind of who he was?

A. No.

Q. And you filed one report in this matter, correct? You did not file a rebuttal report?

A. That's correct.

Q. When did you first see Dr. Ambinder's report?
A. I don't remember.
Q. Do you recall if it was months ago, or like last week?
A. It wasn't last week. It was -- the first time I saw it was over a month ago, I think.
Q. Going back to the first page, Number 4 on the first page of this exhibit says "Deposition Transcript, Jennifer Leach." Do you see that?
A. I do see that.
Q. Who is Dr. Leach?
A. I don't remember.
Q. Okay.
A. I didn't rereview that. I did not rereview that deposition transcript in preparation for today, so -- and I don't remember if I mentioned her in my report. I remember mentioning his oncologist, Dr. Mohrbacher. But I don't know if Dr. Leach was his general practitioner. I'm not sure.
Q. It's not a trick question. I don't know who Dr. Leach is.
A. Yeah.
Q. Okay. You also have on this list

Dr. Bird's report, which I believe you said you reviewed in preparation for today. Is that correct?

A. Yes.

Q. Did you review -- well, do you see 7 through 11 are the Plaintiffs' general causation expert reports?

A. Yes.

Q. Did you review those prior to submitting your expert report, or after?

A. I believe I reviewed them prior and after.

Q. And Number 12 is the specific causation expert report of Dr. Reynolds. Do you recall if you reviewed that prior to submitting your report, or after?

A. No. That one would have been after, I believe.

Q. Turning back to Exhibit 1 -- I'm going to share it on the screen.

And I have page 1 open, although I'm certain you're familiar with your background and qualifications.

And you're certified by the American Board of Pathology, correct?

A. Yes. In anatomic, clinical, and cytopathology.

Q. Do you have any other board certifications?

A. Not other than those three.

Q. As a pathologist, do you interact directly with patients?

A. Yes, on occasion.

Q. How often would you say you interact directly with patients?

A. Well, it's changed over the years. In my first two practices, before 2021, I did fine-needle aspirations directly on patients in a clinic. And so it would be almost daily that a small part of my day would be seeing patients, evaluating them, taking a clinical history, and then doing a fine-needle aspiration, which is a type of biopsy, on whatever palpable lesion they had that they were referred to my clinic from their other provider.

And -- but since I've been in my new practice since January of 2021, I no longer have a fine-needle aspiration clinic, so I don't interact with patients directly, for the most part, except maybe over the phone I get calls from patients asking questions about their lab results or their pathology results, either prompted by themselves or by the referring clinicians that I know in the community.

And that's because we have a very good working relationship, and they know that I don't mind and enjoy talking to patients, other than, you know, with -- which is somewhat unusual as a pathologist, who usually don't like to interact with patients.

I'm not like that. I get a lot of -- it's very rewarding for me to interact with patients, so I still do over the phone, just not in person, like I did for the first 15 years of my practice.

Q. And I understand at a high level, but -- at a high level, your job as a pathologist is to look at various tissues and determine if there is any type of disease in that tissue. Is that fair?

A. I would say that's one of my high-level jobs as a pathologist.

Q. What are your other high-level jobs as a pathologist?

A. Well, I not only look at tissue, but a part of -- that's anatomic pathology. I also, as you mentioned, am board-certified in clinical pathology, which has to do with laboratory testing, transfusion medicine, microbiology. So -- and I'm the chairman of the department, so I am intimately involved in laboratory testing and blood product issuing in the -- the hospital. I am the chair of the cancer

committee and a member of the medical executive committee of the hospital, so I deal with a lot of administration with respect to our cancer center coordination and accreditation.

So I'm also an active teacher and a clinical assistant professor of pathology at OHSU, which is Oregon Health and Sciences University, in Portland. I was just there less than a week ago, in person, teaching the pathology residents, which I do monthly for the last three years.

So I -- I would say I have a lot of -- those are all kind of various high-level aspects to my job as a pathologist.

Q. Sure. And when patients call you, I think you said they call you to talk about findings that you've had in your report related to diseases they have; is that fair?

A. Often, yes, that's correct.

Q. Your report says that you have a strong subspecialty focus in breast and gynecological pathology. Is that fair?

A. That's one of my subspecialty focuses, that's correct.

Q. And you currently work for Pathology Consultants; is that right?

A. Yes.

Q. And is -- you work at a hospital as well, though, correct? So you're in a hospital environment for your day-to-day job?

A. Yes.

Q. Does the hospital pay you, or does Pathology Consultants pay you?

A. So the hospital pays us for a medical director fee that's I think paid monthly. And that is paid not to me directly, but to Pathology Consultants. And then we are then paid a salary, with bonuses, from Pathology Consultants.

So I am not paid directly by the hospital. I don't get anything from the hospital. There have been other places I've been at where, when you're on the medical executive committee, the hospital, around Christmastime, or whatever, will give you a gift or a gift card or something; that does not occur here. It's a rural hospital without a lot of money. So we only get paid, my colleague and I, as -- salary and bonuses from Pathology Consultants directly.

Q. And how many pathologists work at your hospital?

A. Two.

Q. Are they both part of Pathology

Consultants?

A. Well, I'm one of them, and the other one is as well.

Q. So on this first page, in the second paragraph, near the end, it says "During my career, I have had a strong subspecialty focus in breast and gynecological pathology as well as cytopathology, but have routinely been considered by my colleagues to be an expert in the diagnosis of disease processes and cancer throughout all organ systems, often serving as one of the main internal consultants for challenging tumors, including hematopoietic neoplasms."

When you say in that sentence "main internal consultants," are you referring to you and your colleague who works at the hospital with you? Or who are you -- who are the consultants -- who are you referring to?

A. Right. So any -- not just the -- my current colleague, who gives me actually all of his lymphomas, because he's not comfortable signing out hematopoietic system malignancies or reactive processes, so I actually sign out 100 percent of any of the lymphomas that come out of my hospital directly.

But in the past, you know, my prior group,

from 2012 until 2020, I was one of 50 pathologists, and I would get cases from multiple pathologists for my expert opinion, including other hematopathologists, who are board certified in hematopathology, asking me for my opinion on interesting or unusual lymphomas, or, you know, reactive lymph node proliferations.

Same with before that, in Las Vegas, from 2006 until I left at the end of 2012, it was the same thing: That I was one of about 20 pathologists, towards the end, and I would get cases from all over Southern Nevada, as well as Western Arizona, which we had pathologists there, that would -- knew my expertise as a pathologist and would ask me for my opinion.

So it's been all throughout my career, not just limited to my one colleague that I currently have.

Q. So why would someone -- or strike that.

What specialty and training do you have in diagnosing hematopoietic neoplasms or non-Hodgkin's lymphoma that would lead colleagues who specialize in it to come talk to you about a diagnosis?

A. Because I'm --

MS. GJONAJ: Object to form.

THE WITNESS: I'm a really good diagnostic pathologist. And I trained at an institution, Massachusetts General Hospital, where we had some of the best world-renowned hematopathologists. So just because I didn't do a fellowship in it, I did a lot of extra work day to day, as a resident, in hematopathology.

And so -- and that comes across. When you interact with different pathologists, you get to know what they're good at, you know, what they have a good eye for. There have been several cases where I've had a -- what I thought was a -- a lymphoma of a salivary gland -- this was early in my career, in Austin, Texas, at Clinical Pathology Associates -- where I showed it to another hematopathologist, and I said, "I think this is a lymphoma." You know, "Do you agree?"

Because any new malignancy -- every group I've ever been in, any new malignancy, we have a rule or a protocol where we have another pathologist agree, typically before you release the case and sign out the case into the computer system for the patient and the provider to receive. It just is a quality assurance measure

to make sure that we have two people agreeing for a new malignancy.

And so I would have several cases like that that were assigned to me that no one knew was going to be a lymphoma. I get the case. It looks like lymphoma. I work it up. And once I was done working it up, I would show a hematopathologist. And there have been several times where a hematopathologist would disagree with me. And I would look at it again, thinking, "Well, maybe I was wrong. Let me look at this case again."

I'd look at it again. I'm like "No, I think this is -- this type of lymphoma," or whatever. And either we would send it out for molecular testing, or get an additional sample for flow cytometry, or send it to an outside expert pathologist, like Nancy Harris or Judith Ferry at Massachusetts General Hospital, or whoever the hematopathologist would be throughout the country, and they would agree with me.

So then the hematopathologist would think, "Oh. Well, boy, you know, Paul Michaels was right, and I was wrong about that case."

And so when that happens enough, those hematopathologists, regardless of the fact that I'm not fellowship-trained or board-certified in that particular subspecialty, would come to me with their difficult cases, knowing historically that I am a good diagnostic pathologist in all aspects, including hematopathology.

BY MS. HORAN:

Q. And I believe you said that in your current role, you deal with 100 percent of the hematopoietic neoplasms that come through the hospital; is that right?

A. When I'm working, that's correct, yes.

Q. And in your current role, how often do you diagnose NHL?

A. Once a week.

Q. And in your current role, how often do you diagnose diffuse large B-cell lymphoma?

A. Once a month.

Q. Just putting those numbers together, roughly 25 percent of the cases of NHL that you diagnose are diffuse large B-cell lymphoma, in your current --

A. I would say that's about right.

Q. In your current practice, how often do you

come to a conclusion about what caused that individual's non-Hodgkin's lymphoma or diffuse large B-cell lymphoma?

MS. GJONAJ: Object to form.

THE WITNESS: Well, it depends on -- it depends on the type of lymphoma. So I couldn't give a percentage, but I would say frequently.

BY MS. HORAN:

Q. So frequently, you come to a conclusion in your practice today about what caused someone's non-Hodgkin's lymphoma or diffuse large B-cell lymphoma?

MS. GJONAJ: Object to form.

THE WITNESS: Yes, depending on the access I have to medical records, I would say that's certainly more common in that aspect, in that situation, than when I get a non-Hodgkin's lymphoma from an outside hospital that we don't have access to their medical records.

BY MS. HORAN:

Q. How often do you deal with a non-Hodgkin's lymphoma from an outside source, where you don't have access to their medical records?

A. Not often. I would say that's a minority of the time. Maybe 10 percent.

Q. So is it your standard practice that if you determine someone's been diagnosed with NHL, that you try to determine their cause of the NHL?

A. As part -- yes, in the sense that as part of the subclassification system, which is now often defined by etiologies and defined by the scenario which the malignancy -- specifically a non-Hodgkin's lymphoma, and even more specifically diffuse large B-cell lymphoma arises within, I make a -- a strong effort to rule out or rule in any particular known etiologic causal risk factors.

There have been cases where -- not long ago, there was an oncologist who had a patient biopsied; there was a diffuse large B-cell lymphoma that I worked up and did, as part of my routine panel, EBV -- Epstein-Barr virus -- in situ hybridization, and it was positive.

And he was an older gentleman. And I called that oncologist, and I told her, you know, "This is EBV positive. This could be an EBV-associated diffuse large B-cell lymphoma. I would test this patient for HIV."

Because he had no other known risk factors that were causing him to be immunodeficient according to the medical records. But a lot of EBV-associated

diffuse large B-cell lymphomas arise in the setting of immunodeficiency. And one of the biggest acquired immunodeficiencies is based on HIV infection. And so she did an HIV test and a viral load, and his antibody was positive, and his viral load was off the charts.

So that has a huge implication for the prognosis and treatment of that patient, because treating him for his underlying HIV would dramatically improve his prognosis. And because so many aspects of disease and cancer in general, but even more specifically now the WHO, Fifth Edition, Classification of Hematopoietic Tumours, and especially B-cell lymphomas, really depend on identifying a potential etiology that could be altering the treatment or prognosis, I make a strong effort to do that in all of my cases.

Now, you're not always successful, and sometimes the clinical history is limited, or the clinician that actually did the questioning and the intake for the patient did not do an extensive review of all potential etiologies that the person could be exposed to; so you would be limited, in a case like that, to -- to do whatever you could with respect to, you know, established risk factors and the --

determining any sort of established risk factor.

But, you know, these are things we discuss in tumor board, and they are things that I do routinely with my cases.

Q. Do you need to know an individual's medical history and risk factors in order to be able to diagnose NHL or a diffuse large B-cell lymphoma?

A. Well, again, it depends. Some of them are defined -- some of the diffuse large B-cell lymphomas are defined by the clinical history and how they arose.

Like if I just got a biopsy of a soft tissue mass, let's say in the hip, and it looks like a diffuse large B-cell lymphoma, if I didn't know anything, I couldn't be more specific other than to say "This is diffuse large B-cell lymphoma NOS," which means not otherwise specified.

But in a case like that, what I do would be to review the clinical history in more detail, contact the radiologist that did the biopsy, find out if this patient has known chronic osteomyelitis in that bone that was biopsied, or if it's the soft tissue. Is there a chronic mesh implant or metallic foreign body hardware? Because there's now a new classification that has diffuse large B-cell lymphoma

associated with chronic inflammation that arises in those settings, and clinicians often treat these cases differently. So because of that, and because this classification system is evolving, that's exactly why I attempt to find out any more clinical history.

Now, sometimes you can't. And you contact the clinician, and they don't know anything about the patient. The patient was just referred to them. You know, we're a big retirement area. I'm in the Southern Coast of Oregon. It's -- a lot of people move here from other places when they retire, and so a lot of times people come just recently, and started, you know, access to care here, and we have no records. And a lot of patients aren't -- aren't vigilant about keeping their prior medical records. And so sometimes I'm limited, and I just do the best I can in those cases.

But ideally, you want to find out as much as you can to do a good clinical pathologic correlation, not just for the sake of doing it, but for the sake of good patient care and good, you know, health care.

Q. Do you include, like in your pathology report, what you believe the cause of the ailment is?

Or where do you -- is it routinely a part of your form, I guess, that you would provide?

A. If -- if it's identified, yes, because that changes the subclassification.

And in the case of that patient I was talking about recently, with the diffuse large B-cell lymphoma that was HIV-associated, I did not know. It took several days for the oncologist to see the patient to do the testing. I wasn't going to wait to release the case before that.

So I added a comment, and I do that routinely in my malignancies, where I add a comment varying in length, depending on the malignancy, saying, "This was my -- you know, this is what the findings are. This is what this means. This means that this person may be immunodeficient so testing for various viruses or other causes of an acquired immunodeficiency would be indicated in this case."

So I will routinely put that in a comment.

Q. Of the non-Hodgkin's lymphoma cases that you've diagnosed, what percentage of them have you been able to determine the cause of?

A. I would say -- as I said earlier, I would say it's frequently; but as far as percentage, I would say less than half. But it depends on my

access to the medical records.

Q. And in your practice, how often have you been able to determine the cause of someone's diffuse large B-cell lymphoma?

A. Again, it would -- it would depend on -- the more history I'm given, the more access I am to detailed medical records, the higher that percentage would be.

So it would really just depend on the particular case. I don't think I could give a -- I don't think I could accurately give a percentage, because it's so dependent on the other factors that I may or may not have access to.

Q. Have you ever sought an interview with a patient in order to find out something about their medical history in order to determine the cause of their NHL?

MS. GJONAJ: Object to form.

Sorry. I didn't realize I was on mute.

THE WITNESS: Could you repeat that? I'm sorry.

BY MS. HORAN:

Q. Sure. Have you ever sought to interview a patient to ask them questions about their medical history in order to determine the cause of their NHL?

A. There have been cases where I have asked -- I guess the answer would be yes, because there have been cases in the last several years where I have asked the clinician who ordered the biopsy if they could go back and ask the patient X, Y, and Z question, which is what I typically do. And I always offer: "If you'd rather, I can talk to the patient."

Now, most of the clinicians that I deal with would rather talk to them themselves. And so -- but I have -- in that sense, I have sought to interview them, or to ask them additional questions. I guess -- but usually what happens is those providers that ordered the biopsy that I have then reviewed will then go and ask the patient the questions that I have posed that I don't have access to.

Q. So when you're reviewing someone's NHL and trying to determine the causation, what are the risk factors you look for?

A. Well, with respect to ones that I'm concerned about -- like there are multiple risk factors for different non-Hodgkin's lymphomas. With respect to diffuse large B-cell, the ones that I'm most concerned about, that I can basically -- you know, that would affect my report, I should say,

would be any sort of genetic susceptibility. So like Li-Fraumeni syndrome, which is a mutation in the gene TP53, which causes a -- a syndrome called Li-Fraumeni -- L-i, Li-Fraumeni -- that would give rise to multiple malignancies, including lymphomas, and leukemias. Any sort of inherited immunodeficiency states -- and this would be more often for younger patients, like DiGeorge syndrome or any other T-cell or B-cell, like chronic -- or common variability immunodeficiency, CVID.

If the patient's had an organ transplant -- because a lot of times we have patients -- we don't do organ transplants locally, but we have patients that, as I mentioned, come here and have had organ transplants that are then followed here.

And that would again change my diagnosis, because if it looks like a diffuse large B-cell lymphoma, and I don't know that the patient's had a transplant, and I call it diffuse large B-cell lymphoma as my top-line diagnosis, I'm wrong. Because that's a -- that's a type of post transplant lymphoma disorder, PTLD, which should be classified as such, and then subclassified by there as a large B-cell lymphoma. But that would affect what I do.

Any sort of autoimmune condition is another causal risk factor. So like lupus, Sjögren's syndrome, rheumatoid arthritis; that would change how my diagnosis is.

And again, this is all based on the new classification system. Patients that have had a long standing effusion, whether it's pericardial or pleural or peritoneal, those would be considered fluid overload-associated.

Diffuse large B-cell lymphomas which is a separate category. If they have any sort of pseudo cyst in their body, like around the pancreas or somewhere elsewhere, where they have -- fibrin develops within a pseudocyst; those are fibrin-associated diffuse large B-cell lymphomas.

Again, for diffuse large B-cell lymphoma and the Hodgkin lymphoma in general, various infections, so -- I already mentioned HIV. HHD8, which is human herpesvirus 8, causes some diffuse large B-cell lymphomas and other malignancies like Kaposi's sarcoma. It causes some nonmalignant lymphoid proliferations, like plasma cell variant of Castleman's disease. There's hepatitis C, is a risk factor, a causal risk factor for non-Hodgkin lymphoma, including diffuse large B-cell and

hepatitis B also.

And I think helicobacter pylori in the stomach causes an extranodal marginal zone lymphoma which is -- the other name is MALT lymphoma, M-A-L-T, which stands for mucosa-associated lymphoid tissue lymphoma.

So those give that lymphoma which can then progress into a diffuse large B-cell lymphoma. So in that case, helicobacter pylori would be an example of a causal risk factor in that setting.

I think that's predominantly what I can think of, off the top of my head.

Q. Do you -- or strike that.

How often do you tell a patient that it's impossible to know the cause of their NHL with any certainty?

MS. GJONAJ: Object to form.

THE WITNESS: How often -- I've not really been approached with that situation, where I've been asked that. There aren't many things where, you know, you can ever be 100 percent certain with anything. I think, you know, you just have to give your overall opinion, based on a particular patient's clinical history and presentation, and their specific histologic

subtype, to come to any sort of conclusion; but usually it's not with 100 percent certainty.

BY MS. HORAN:

Q. Sure. How often -- setting aside the certainty-question piece of that, how often do you tell a patient you don't know the cause of their NHL?

MS. GJONAJ: Object to form.

BY MS. HORAN:

Q. Or put it in the form, or however you communicate it to their physician?

A. I don't know that I'd be able to have a way to quantify that, because, you know, I'm not usually asked that, and in that context. When I've seen patients in the past, most of the time it's in the setting of initial diagnosis. And I, as a routine, did not give patients directly a new diagnosis of a malignancy, because I did not think it was appropriate for me, as my role as the diagnostician in that particular instance where a patient came to my clinic, to then elaborate on what their actual diagnosis is, even though oftentimes I knew it before they left my office.

Because the -- the general timeline is that I would interview a patient; I would biopsy the patient with one pass of the needle; I would go in

the next room, stain that, take a look at it under the microscope, under the assumption that I was doing that to make sure I had an adequate sample so the patient didn't have to come back. And that is why I did it.

But at the same time, oftentimes I knew the diagnosis. And if it was malignant, I did not go back in that room and say, "Guess what? It's malignancy. It looks like you have a lymphoma." And even in that case, you can never -- almost never subtype a lymphoma based on a fine-needle aspiration, especially immediately, on a rapid, immediate assessment.

And so I was never really posed that particular situation with any malignancy. I've been posed that with multiple other types of tumors, but not with -- specifically with a lymphoma where I've had to have that conversation with a patient.

Q. So I just want to make sure we're on the same page. I'm not asking about telling a patient their diagnoses, or a subtype, or what the actual diagnosis is. I'm wondering how often, when you determine there's an NHL, do you determine that there's no known cause of that NHL?

MS. GJONAJ: Object to form.

BY MS. HORAN:

Q. Tell them or their -- their physician, if you do it through the form or however you do it, that "This is the diagnosis. I don't know why this individual developed NHL."

A. So again, I -- I feel like you asked me that question, and I said it would depend on the particular type of NHL. It would depend on how much I had access to the medical records. Sometimes these conversations also take place in tumor board, where we go into more depth about a patient's risk factors and potential causes, and elaborate more in that setting.

So I don't think I could give you -- as I said before, I -- I frequently do -- I don't think I could give you a percentage, because the denominator is so varied.

Q. You listed a number of risk factors for a diffuse large B-cell lymphoma -- and I apologize. We've been going over an hour. Would you like a break? Are you okay to keep going?

A. I'm okay.

Q. Okay. You listed a number of risk factors earlier for the development of diffuse large B-cell lymphoma that you would look to to try to understand

the cause of -- of a disease.

Do you ever ask or inquire into whether an individual in your practice was exposed to TCE, PCE, or benzene in determining cause of their NHL?

A. Only to the extent that I ask that -- I will look for specific environment exposures; patient -- the patient's work history, et cetera. And that would -- that wouldn't necessarily change my diagnosis, because none of the diagnoses are defined by chemical or carcinogen exposure, necessarily; but it would help confirm or at least support my opinion that I am dealing with a malignancy, because sometimes it is difficult on small biopsies to know what you're dealing with.

And if I know that there's that history of, you know, pesticide exposure, chemical plant exposure, whatever the type of chemical exposure would be, based on a patient's work history or occupational exposure level, that does help form my opinions, but it wouldn't necessarily change the diagnosis. But it is information that I find useful.

Q. Have you ever -- I think you said you mostly communicate the cause via a form, but -- via the form that you sign, or the -- via communications directly with the patient or their doctor.

Have you ever noted that the cause of someone's NHL was, in your view, due to -- due to a chemical exposure, from their work history?

MS. GJONAJ: Object to form.

THE WITNESS: Well, again, it's usually -- those kinds of questions and those kinds of evaluations often come -- or happen in the context of tumor boards or direct clinician conversations. And they often occur after molecular testing has been performed, in some cases, depending on whether it's a bone marrow biopsy or things like that because, you know, a treatment and a cause of some hematopoietic tumors is chemotherapy, which is a type of toxic chemical.

And oftentimes a patient has gotten chemotherapy for one malignancy and then develops a new malignancy that's some type of either myelodysplasia, or myeloproliferative disorder, or leukemia, or non-Hodgkin lymphoma. And based on the molecular testing, if it's a complex karyotype, that suggests to me that it would be related to some sort of toxic exposure like a chemotherapy in that case.

So there have certainly been cases where,

based on the molecular genetics and based on a patient's particular exposure history, where we've had that conversation; and sometimes that's put into a comment, or with some of these, you know, treatment-associated malignancies into the actual diagnosis.

But typically that's a conversation that's had between the pathologist -- in case, me -- and the clinician -- usually an oncologist -- who kind of is the one that's going to be treating that patient and is more aware of their exposure and risk-factor history with respect to the malignancy that they're treating them for.

BY MS. HORAN:

Q. In your practice, to the best of your knowledge, have you ever -- well, strike that.

A pathologist is part of a -- a patient's treatment team? Or how would you describe your -- are you part of the care team? I don't -- I want to use the word that you would consider yourself to be: A medical team? I don't know kind of what -- what word you use.

A. Yeah, I think "medical team." I mean, you could use any of that. I mean, obviously I don't do any of the treatment myself, but the treatment

depends on my diagnosis, so you could consider me part of the, you know, medical team, treatment team. I think any of that sounds -- is fine.

Q. Okay. In your practice, and to the best of your knowledge, have you been part of the medical team of a patient that was diagnosed with NHL that was at Camp Lejeune between 1953 and 1987?

MS. GJONAJ: Object to form.

THE WITNESS: Not that I've known of.

BY MS. HORAN:

Q. Have you discussed Camp Lejeune with, directly, any of your patients, or any of their oncologists that you communicate about their diagnoses with?

A. I don't believe so.

Q. Have you ever asked an oncologist to inquire whether an individual was at Camp Lejeune between 1953 and 1987?

A. Not specifically, no.

Q. Outside of this litigation, has anyone asked you if their non-Hodgkin's lymphoma was caused by exposure to water at Camp Lejeune?

A. I don't believe so, no.

Q. One of the things you mentioned earlier was -- correct me if I'm saying this wrong -- but you

don't diagnose someone by their chemical exposure, but you might take into consideration that someone worked on a -- with pesticides, or at a chemical plant. Am I repeating you correctly?

A. Well, it's -- I would say it's not that I -- I wouldn't say that I don't diagnose them based on their chemical exposure. It's one of the aspects of their clinical history that I would take into account, but depending on the malignancy, not necessarily change the diagnosis that's on the pathology report.

Q. Sure. And there are no biomarkers for TCE or PCE or benzene which would indicate that an NHL had developed in light of exposure to any of those chemicals; fair?

A. Not with any specificity. I would say that's fair.

Q. If you saw a patient who had an NHL and had a work history as an individual who worked at a chemical plant, what other types of things would you want to know about their chemical exposure in order to determine if that might have been a cause of their NHL?

MS. GJONAJ: Object to form.

THE WITNESS: So in those cases where that

has actually been the case, I would want to know when that -- when it was, when their exposure history started, and what their role was with respect to chemicals.

Those would be the main things that I would ask. I wouldn't ask -- again, because it wouldn't -- in that particular context, when we're dealing with, you know, how we're going to treat the patient and how we're going to assess their prognosis, those things aren't really, for the most part, going to play a huge role, so it's not typically on the forefront.

If we've determined that it's likely based on a chemical exposure, except for if they're still currently in that exposure situation, then you want to minimize any future exposure. So I would say a timeline of, you know, when they started working and when they -- what their role is in that context.

BY MS. HORAN:

Q. And why would you want to know what their role was?

A. Well, if it's someone who was, let's say, a transcriptionist or a secretary and didn't actually -- you know, at a tire factory plant, and

they weren't ever in the factory, and they were off site, then I'd say, "Okay, well, that's -- that's a red herring. Just because they're a tire factory worker doesn't mean that her bladder cancer is from that, or her lymphoma was from that."

It would -- you know, I would -- you know, not kind of -- I would still be -- and I would anyway -- looking for other etiologies and think that's less likely to be associated with this malignancy.

And as far as timeline, it would be, you know, if someone was diagnosed with -- you know, let's say an individual was diagnosed with a low grade B-cell lymphoma type of a non-Hodgkin lymphoma and they had only been exposed at a particular job site for a year, but yet when you go back to prior CAT scans, you could see in large lymph nodes two years before, that were just kind of missed or maybe thought to be reactive, but eventually they were diagnosed as malignant.

Well, the temporality in that wouldn't make sense. So even though they were exposed to a particular chemical, and maybe had a high level of exposure, if the malignancy was there before the exposure, then there's really not a significant

association in that case.

So those are things that I would kind of look for.

Q. Sure. And just to go back to your tire factory example, you -- you're looking to understand what the individual's actual interaction with the particular chemical was, when you asked them, and try to determine whether that chemical would have been the cause of their -- or the likely cause of their NHL?

A. Yeah, in the sense of -- if someone was always off site, like I said, and not actually in the factory, and they were in an off-site building, that they technically worked for a tire factory company or a -- you know, gasoline company or, you know, refinement industry, whatever; but if it's someone that -- oh, they were a -- they were a courier, and they were usually in their car, but, you know, spent some time, you know, exposed to those chemicals when they were going through the factory to pick up mail or something, that would still be significant.

It wouldn't have to necessarily be someone that was working on the factory line that was exposed all the time, because when you're dealing with these mutagenic, clastogenic, genotoxic substances, that

kind of exposure is significant, even if it's short-term. But if it's someone who was never exposed and was never in an area that would have ever been considered exposed to those chemicals, then that would be something that would -- you know, I would take into account when forming my opinions. If that makes sense.

Q. Sure. So in the context of a factory worker, if they're -- you're -- you're trying to determine in a binary manner if they were exposed or not? Or are you looking for kind of the amount of exposure?

A. Well, you know, in any given diagnostic pathology report, if I'm not asked to kind of opine to that, then I would do it more as an academic setting, and say, "Oh, you know, it's likely that, you know, you don't need to go looking for all these other autoimmune diseases in this patient." You don't need to go looking for -- necessarily for esoteric infections. HTLV is another infection that can cause lymphomas, but -- like you don't need to go looking for, you know, or assume that you missed another infection, et cetera.

Like it's -- it's one thing that you take into consideration with respect to, you know,

evaluating or coming to an opinion on any sort of etiologic cause, which is not done as much as it should be in medicine, because prevention is extremely important; and if someone has a continued exposure to something, and they are known to develop a malignancy that is, you know, noted to be associated with that exposure, that exposure needs to be eliminated as much as possible.

And that's the real reason why you go through that -- that process and why you go through that, you know, kind of algorithm, to figure out what a cause would be for a malignancy.

It's similar to women that develop breast cancer and were on hormone replacement therapy. If you didn't go to the trouble of finding out -- "Oh, they were on hormone replacement therapy," you wouldn't know to tell them to stop it, if they have a hormone-positive tumor.

So it's that kind of analysis that is important in medicine. It goes a step beyond what maybe some physicians do in their general practice, but it's what I strive to do in mine.

Q. Sure. Back to your rubber tire factory example that you were using before. I believe you said that if the person was a secretary and never had

any exposure to the actual factory floor, then you would not conclude that just the fact that they worked at the factory, that that was -- the chemicals in the factory were the cause of their NHL. Am I understanding that correctly?

MS. GJONAJ: Object to form.

THE WITNESS: Again, it would depend on the particular circumstances where -- like I said, if they were off site and nowhere near the factory and they never had any exposure to the factory workers or the products that went through, yeah, that would -- that would be different in that hypothetical example.

BY MS. HORAN:

Q. And in that same example, if someone said they did work in the factory, would you want that same analysis to understand how they interacted with the chemicals, and how much chemicals they interacted with, in order to determine that their exposure was the likely cause of their NHL? Or would you -- would -- does the fact that they had been exposed at the factory be sufficient for you to determine that it was the likely cause?

MS. GJONAJ: Object to form.

THE WITNESS: Well, again --

BY MS. HORAN:

Q. Strike that.

I guess my -- would you be interested in kind of the amount that they were exposed to, or would it just -- is it just a -- a matter if they were exposed?

MS. GJONAJ: Same objection.

THE WITNESS: Again, it would depend on what you're talking about, the exact exposure. And, you know, I think several times you said "the likely cause," which, you know, I would think of it more as a cause, or a contributing cause, that you could opine based on, again, the weight of the evidence.

If you -- if I was asked to opine on that by a clinician, I would say that exposure would be a likely cause; but you do want -- you know, there's -- we're talking about things that -- that, you know, maybe not necessarily have known thresholds, because you can't really, realistically, with a carcinogen, do any sort of ethical randomized control trial to establish a threshold, which I feel like it's what you're getting at with extent of exposure.

All you can do is go based on, you know,

observational studies that have looked at a particular disease occurring at a particular exposure level. So -- and that's not something that is done day to day in a pathology report. It's only something that you can opine to in the setting of having full access to information and being asked by a clinician, "What do you think that this exposure was, you know, a cause, because the patient's asking me."

And I would need to know more information, and then, again, come to a conclusion based on the -- the subtype of whatever malignancy they're diagnosed with, whether it's a type of bladder cancer, what other risk factors they had.

So it's -- again, it's taking the weight of the evidence and not looking at one particular thing when coming to any sort of conclusion about a cause for any malignancy.

BY MS. HORAN:

Q. I'm going to turn to your résumé, which was attached to your report.

Dr. Michaels, since you submitted your report, are there any updates to your résumé?

A. Well, I don't know. I don't see that it

says that. It's hard to see, but I don't think -- I don't know. Does it say that I'm the chair of the cancer committee? I don't think it has that. That's a recent development in the last couple months, and I don't think I updated my CV to say that.

Yeah, it says "member of cancer committee," under my current job. It doesn't say that I'm the chair of the cancer committee, which I am now. So that's one thing.

And then if you could scroll to the next -- something I just thought about.

Q. Sure.

A. It has my -- scroll one more.

Okay. It has my academic appointment at OHSU. Oh, for medical licenses, I now have a -- I reactivated my Massachusetts medical license, so I need to update my CV to reflect that. But everything else should be -- and then if you go to the next publication.

Okay. So then I just recently published another article that just came out this year, a couple months ago, that I need to add, that had to do with a -- a multicancer early detection assay that showed positivity in a patient, and they ended up having an unusual diagnosis, and so I published the

case report.

So I can update those and forward them to Ms. Gjonaj.

Q. Great. Have you ever authored any publications on the causes of NHL?

A. So in the "Fine-needle Aspiration Biopsy of Secondary Neoplasms of the Thyroid Gland" that was -- that we published in 2015, I would have to go back and look at that, because, you know, the reason that -- and I had been the first author on that publication, and that was when I was in my fellowship, and I had initially written that paper myself. And then -- that was in 2006, and you can see it was published in 2015, which is how some things in academia work sometimes, unfortunately.

But by the time I had left, and they kind of -- the -- Dr. Faquin, William Faquin, who was a senior author on that, he -- he and I were the ones that initially came up with the idea. And it was my idea to have the words "Secondary Neoplasmas of the Thyroid Gland" specifically because of lymphomas, Because he wanted to call it "Metastatic Tumors to the Thyroid Gland."

And I said, "Well, you can't" -- a significant portion of the malignancies that we were

talking about were lymphomas, and you don't consider a metastatic -- a lymphoma metastatic when it involves an unusual site, depending on the history, you consider either primary to the thyroid gland or secondary. And you don't use the word "metastasis."

And some of those patients were patients that had underlying autoimmune diseases. And so that would have been the underlying cause; specifically, I think, Sjögren's syndrome was in a couple of those patients.

And so I don't know -- I don't -- I haven't memorized that article, but we might have talked about, in that setting, a cause of a non-Hodgkin's B-cell lymphoma.

Q. Can you point me to any publications that you've authored involving TCE, PCE, or benzene?

A. I don't think I've -- anywhere I've mentioned any of those volatile organic compounds.

Q. And you've not authored any publications on whether PCE, TCE, or benzene can cause NHL? Is that fair?

A. That's fair.

Q. Have you authored any publications where you've determined a threshold amount of exposure to TCE, PCE, or benzene before someone's risk for

developing NHL increases?

A. No.

Q. Have you ever given a presentation or spoken publicly about Camp Lejeune?

A. I don't know if I've mentioned it in the setting of teaching to the pathology residents. I don't specifically recall mentioning this litigation at all. I've mentioned other litigations I've been involved with in the setting -- in a very general setting of showing them, you know, examples of cases where I saw a similar case when I was an expert witness for X, Y, and Z, but I don't think that I've ever mentioned Camp Lejeune in that context.

Q. You're not an epidemiologist, correct?

A. So I was trained in epidemiology, in addition to various other disciplines in medical school, and I use epidemiology constantly, as a pathologist, interpreting ongoing published research in my field and similar related fields. But I am not myself a Ph.D. or have any extra specific training in public health with respect to epidemiology.

Q. And you aren't a toxicologist, fair?

A. So again, in chemical pathology, which is a part of clinical pathology, toxicology is a significant part of chemistry within -- and I don't

mean chemistry is like the -- the college course chemistry. Chemistry deals with, you know, clinical laboratory testing, you know, chemistry panel in the sense of sodium, potassium, et cetera, and toxicology testing. And so as the chair of the department and as a board-certified clinical pathologist, I actually do quite a bit of -- and have a significant knowledge base in toxicology. But I'm not myself a toxicologist, separately from that.

Q. So you use a lot of toxicology principles in your practice, but you wouldn't hold yourself out as an expert in toxicology; is that fair?

A. Well, no, I would say that as a board-certified clinical pathologist, I would say that I would be considered an expert in toxicology in that context. But I'm not -- I would not hold myself out to be a toxicologist, which some people would consider to be separate from toxicology within clinical pathology.

Q. You don't have a degree in environmental health, correct?

A. No, I don't have a degree in environmental health.

Q. And you don't have a degree in occupational medicine; is that fair?

A. My -- I do not have a separate specific degree in occupational medicine.

Q. And you're not an expert in environmental risk assessments. Is that fair?

A. Well, again, I -- I would say, as part of my job as a pathologist, as I've kind of elaborated on for the last hundred minutes, I do quite a bit of assessing of environmental and other biologic risk factors. So I would say that that's part of my realm as a pathologist, is something I use constantly in my diagnostic practice.

Q. Have you ever conducted a human health environmental risk assessment?

A. I have never published anything with respect to environmental risk assessments.

Q. Setting aside "published," have you ever conducted one?

A. I don't know that I would consider myself having conducted any sort of environmental risk assessment.

Q. And you're not offering an opinion in this case on whether vinyl chloride causes non-Hodgkin's lymphoma, correct?

A. Well, I mentioned vinyl chloride, but not -- not -- just in the background of exposures,

but not in the sense that it was a cause -- a significant cause for Mr. Vidana's diffuse large B-cell lymphoma.

Q. We are nearing two hours, about an hour and 45 minutes. Do you mind if we take just a ten-minute break -- I'm at a kind of a good breaking point -- and then we can come back.

A. That's fine.

VIDEOGRAPHER: We're going to go off record at 10:43 a.m.

(A recess transpired from 10:43 a.m until 10:55 a.m.)

VIDEOGRAPHER: Back on the record at 10:55 a.m.

BY MS. HORAN:

Q. Dr. Michaels, have you been to Camp Lejeune?

A. No.

Q. What is your understanding of what areas of Camp Lejeune were contaminated?

A. My understanding is it's predominantly Hadnot Point and Tarawa Terrace.

Q. You would agree that all of the water systems at Camp Lejeune were not contaminated; fair?

MS. GJONAJ: Object to form.

THE WITNESS: My understanding is that not all of the ones that were tested were contaminated.

BY MS. HORAN:

Q. Okay. So the best of your knowledge, not all of the water systems at Camp Lejeune were contaminated?

A. Well, again, not all of the water systems that were tested were contaminated, correct.

Q. Is it your -- or strike that.

To the best of your knowledge, was Camp Johnson contaminated?

A. Not to my knowledge. It's not known that Camp Johnson was contaminated.

Q. And you relied on Mr. Maslia's report for levels of contamination at Camp Lejeune?

MS. GJONAJ: Object to form.

THE WITNESS: Yes, the, you know, ATSDR report by -- with -- you know, Maslia, and then the expert report that followed.

BY MS. HORAN:

Q. And you're not offering an opinion as to the accuracy of the ATSDR or Mr. Maslia's findings, correct?

A. No, I'm relying on those levels that were

reported.

Q. Did you read Mr. Maslia's rebuttal report?

A. I -- off the top of my head, I don't know if I did or not.

Q. Have you read any of the other non-Hodgkin lymphoma specific causation expert reports?

A. It would depend -- I would recognize the -- potentially the name. If it's not on my "Materials Considered" list, I thought that that was -- it appeared inclusive of what I had reviewed.

Q. Got it. Okay. So if it's not on your "Materials Considered" list, then you didn't see it?

A. Probably that's correct, yes.

Q. I didn't see this, I'll represent to you -- and we're happy to go back to your "Materials Considered" list if it would be helpful -- but I did not see the historian's report. Did you -- do you recall reviewing Dr. Longley or Dr. Bringham's reports? They're on the history of Camp Lejeune.

A. That doesn't sound familiar.

Q. Your "Materials Considered" list included a number of general causation expert reports by the Plaintiffs, and I believe you testified that you reviewed those prior to submitting your expert report. Am I remembering that correctly?

A. Right. With the exception of Dr. Reynolds, I believe.

Q. And you performed your own general causation analysis that you've included in your report, correct?

A. That's correct.

Q. Why did you perform your own general causation analysis instead of relying on the expert reports that you reviewed?

A. Well, I -- I did look at the other expert reports, but if I'm going to be testifying about whether a particular patient's exposure was a cause for their malignancy, whether it's -- you consider it a substantial contributing cause or "at least as likely as not" cause, that's something that I would want to perform my own evaluation of the literature. I would certainly take into account the opinions and the research of others, but ultimately it's something where I have to incorporate the weight of the evidence to include, you know, exposure levels, what's been established in the literature, mechanistic data with respect to the chemicals we're talking about, and a variety of other extenuating factors. But that's something that I would want to -- in order to testify under oath to my opinion, I

would want to have reviewed that and provided a general causation analysis myself.

Q. Are you relying on the Plaintiffs' general causation experts in your opinion?

A. Other than, you know, the data that, you know, Dr. Reynolds has that I -- was published after my report -- or not "published," but I guess issued after my report -- I wouldn't say that I'm relying on any of their reports. I certainly evaluate them and agree with the vast majority, you know, that has been stated in their reports, but I wouldn't say that I'm relying on them, like I would rely on a peer-reviewed published study or, you know, data that's been, you know, gathered and published in the literature.

Q. Why -- strike that.

Have you reviewed any of the United States general causation expert reports?

A. Were those not the ones that we talked about earlier, that are on my "Materials Considered" list?

Q. I'm going to pull up your "Materials Considered" list again. So, bringing back up Exhibit 2.

Dr. Michaels, do you see it on your screen?

A. Yes.
Q. So there's -- general causation expert reports are on -- it looks like they're listed as Numbers 7 through 11. Do you see those?
A. Yeah.
Q. Okay. And is it your understanding that these are Plaintiffs' general causation expert reports? Or are they United States?
A. Well, could you scroll to the other pages? Because I thought the other pages had -- so aren't those 1 through 4, under "Expert Materials"? Are those not --
Q. So those are the --
A. Sorry.
Q. Sorry. Let me -- let me ask the question.
So is it your understanding that on the last page of Exhibit 2, Expert Materials 1 through 4 are the general causation expert reports by the United States? Or specific causation expert reports?
A. I -- I didn't know --
MS. GJONAJ: Object to form.
THE WITNESS: I -- I just thought you meant -- sorry. I thought you meant only Plaintiffs' reports.
I don't think that those were -- I don't

know if they included any general opinions. I don't remember if they've included any general opinions. But for the most part, I think those were addressing Mr. Vidana's case.

But I don't know if, like mine, they also included -- as you had already, you know, alluded to -- my own general causation aspect, because I thought that they did.

BY MS. HORAN:

Q. Have you -- does the name "Dr. Goodman" ring a bell?

A. It rings a bell.

Q. Have you reviewed the reports by Dr. Goodman in this case?

And I'm happy to scroll through. I didn't -- I'm not trying to trick you. I'm happy to scroll through. I don't -- I don't recall seeing them on your list, but --

A. Yeah, I don't either. I -- the name sounds familiar in this context, but I don't specifically remember, as I sit here, that I reviewed her, right? It's -- isn't it --

Q. It is, yeah. And I guess, for -- I believe you cite to one of her studies in your -- in the substance of your report.

A. Oh, okay.

Q. But I'm just wondering if you also saw her expert report in the case.

A. I don't recall.

Q. Okay. You did not conduct -- let me take down Exhibit 2.

You did not conduct a Bradford Hill analysis; fair?

A. Well, I thought I alluded to Bradford Hill analysis, but I -- in my report. But I didn't like list them completely separately and specifically, and go through each of the nine or -- factors in Bradford Hill. But that's something that kind of -- do evaluate in this context with respect to causation.

Q. Do you agree with the principle that the dose makes the poison?

MS. GJONAJ: Object to form.

THE WITNESS: Well, again, that's something that I also alluded to in my report. But that's very dependent on the poison and the mechanism of the poison.

And so for something like a -- that has sole promoter effects, as far as its role in carcinogenesis, then typically yes, the dose makes the poison. But if you're talking about

genotoxic initiator effects, then -- although dose does come into play, it's not necessarily a requirement. It depends on a whole host of other factors, specifically with the mechanism of how it initiates tumors and its specific genotoxicity.

BY MS. HORAN:

Q. Does the dose make -- or -- strike that.

Would you agree that the risk for developing a disease from a chemical exposure increases with dose?

A. I would say, as a general principle, that's generally accurate.

Q. What level of exposure to TCE is necessary to cause NHL?

MS. GJONAJ: Object to form.

THE WITNESS: Well, as I kind of alluded to earlier, that there -- you know, it's -- it's very difficult, with a known carcinogen, to come up with any sort of known dose or known threshold cause of a particular disease; that what you need to rely on is observational studies, mechanistic data, take the weight of the evidence, and, you know, what we know from some of the observational studies are amounts

that -- those amounts have been associated with an increased risk of a particular type of malignancy in the case -- in this case, non-Hodgkin's B-cell lymphoma.

So it really depends on the data that's been able to be done, because as I alluded to earlier, and talked about, you can't really do a randomized controlled trial with a known carcinogen, because that would be impractical and unethical to -- to do such a thing, where you would expose individuals to varying known carcinogen levels, and follow them for years, to determine disease prevalence or incidence, or mortality related to it.

So, you know, it would really depend on the data that you're evaluating and the way its study was done to -- to come up with any sort of interpretation as far as, you know, what dose is associated with a malignancy.

But even with that, you know, that could vary significantly, based on how the study was done and -- and the type of confounding variables that are seen in the study, the nondifferential bias, et cetera.

BY MS. HORAN:

Q. Do you agree that the body has mechanisms to repair DNA damage at low levels of exposure to genotoxic substances?

MS. GJONAJ: Object to form.

THE WITNESS: Well, that's the way that the body is supposed to work. But some of those mechanisms are also targeted by those same carcinogens. So that is the general rule of the immune system and your DNA repair mechanism; but if you're being exposed to a substance that also targets the immune system, or targets those DNA repair mechanisms, then it would be -- it's difficult. And that's why those -- some carcinogens or some chemicals are listed as carcinogens because they target those repair mechanisms.

BY MS. HORAN:

Q. For the DNA repair mechanisms to be targeted, the body has to be overwhelmed by a high level of exposure; fair?

A. No. That's not accurate at all.

Q. And why not?

A. Because it's not accurate. Because it doesn't have to be a high level of exposure. It

depends on a particular person's immune system, whether they have any sort of inherent immunodeficiency or an acquired one, based on that particular exposure.

That's exactly why patients that have immune deficiencies, like patients that have AIDS because of an HIV infection cannot mount an immune response to malignancy. And when you treat their underlying immunodeficiency, the malignancy goes away.

And so it doesn't have to be a high level at all. It would be very dependent what you're talking about, what specific exposure you're talking about, and what malignancy you're talking about.

Q. A bit earlier you were talking about how studies look at the amounts exposed to a particular -- particular contaminant -- we'll say TCE -- might show an increased risk. Do you recall kind of talking about that, just a -- a few moments ago?

A. Yes.

Q. Okay. What level of a TCE amount or dose is associated with an increased risk in developing diffuse large B-cell lymphoma?

A. So there are studies that -- where I've

seen it evaluated as -- I've seen 5 parts per billion for TCE. I've also seen it where they didn't specify a dose, but it was as low as 30 days, or one quarter, which -- one quarter would be, you know, three months. But that was the lowest time period from that particular study; I think it was Bove, actually.

And we don't know of anything lower than that. It's very possible something lower than that could have also caused the same disease, in this case diffuse large B-cell lymphoma.

So I would say, from where there has been a delineation of exposure amounts, I would say 5 parts per billion.

Q. And so your risk of developing non-Hodgkin's lymphoma is increased after your exposure to 5 parts per billion of TCE? That's -- am I understanding you correctly?

A. Right. With a -- a minimum duration that's been kind of established as at least 30 days, a 30-day exposure period.

Q. And -- okay. So putting that together, your -- you have an increased risk of developing -- strike that.

You have an increased risk of developing

diffuse large B-cell lymphoma if you're exposed to 5 parts per billion of TCE over 30 days? Is that your opinion?

A. Well, and that would also depend on what other exposures you're having at the same time. Because, you know, we know that these volatile organic compounds act at least, you know, additively, if not synergistically. So, you know, so looking at one particular chemical alone is not really the situation that we're dealing with with the Camp Lejeune water contamination.

So it's hard to piece out each individual one. But as far -- as best as we can tell, again, without not having randomized controlled trials, in that just looking at TCE alone, that would be kind of what the data seems to suggest, based on the observational studies, again, in combination with the mechanistic data.

Q. And what observation studies are you referring to for the opinion that your risk increases at exposure to 5 parts per billion over 30 days?

A. So I think that was in -- well, that's in combination with the ATSDR, where they talked about 30 days. And I think another article . . .

Q. Would it be helpful if I pulled up your

report, and you could tell me what studies you're referencing?

A. Sure.

MS. GJONAJ: You can open the chat if you need to scroll through it yourself, Dr. Michaels.

MS. HORAN: Sure. Yeah, it's still in there. And I -- I put it on the screen as well.

BY MS. HORAN:

Q. I'm on Exhibit 1, and I've scrolled to page 7, which is your section that begins on TCE. But of course I'm happy to go wherever you'd like.

A. Okay.

I know I specifically mentioned the 30-day timeline in my report. Just trying to think of --

Q. So in the middle of page 7, that big paragraph in the middle says, "This is" --

A. Oh, yeah.

Q. "This is consistent with the establishment of a minimum duration at Camp Lejeune of 30 days in order to be eligible for the health benefits under the Camp Lejeune Act. This is specifically addressed in the ATSDR 2017" -- then the name of the report -- "where it is noted that 'the results from the Camp Lejeune mortality studies suggest that a 30-day

minimum duration requirement may be appropriate since elevated risks for some of the diseases evaluated were observed for exposure durations of 1-3 months.'"

Is that what you're referring to?

A. Yes.

Q. Okay. Is it your understanding that those 30 days are based on science?

A. Yes.

Q. And what science are you relying on to say that?

A. Well, again, I would -- if you -- I think if you pull up the ATSDR, that document that I'm talking about, they go into details about why they support that -- they specifically say that the data supports that use of that timeline.

Q. Dr. Michaels, do you see on your screen the ATSDR report that we were just referring to?

MS. GJONAJ: Counsel, if you can please drop that in chat for him as well, please.

MS. HORAN: Sorry.

I'll mark this as Exhibit 3.

(Exhibit 3 was marked for identification.)

MS. HORAN: And this is the ATSDR Assessment of the Evidence, dated January 13th, 2017.

BY MS. HORAN:

Q. Turning to page 11, you see it says "Assumptions on Duration of Exposure"?

A. Yes.

Q. It begins, "One objective of this report was to evaluate whether there was sufficient information in the scientific literature to determine a minimum duration at Camp Lejeune, or a minimum level of exposure, necessary to increase the risk of one or more of the diseases being assessed."

Did I read that correctly?

A. Yes.

Q. And then that answer is at the bottom, which is the last sentence on page 11, reads: "Given that sufficient evidence for a threshold is lacking, ATSDR recognizes that a decision to establish a specific minimum exposure duration for policy purposes will primarily be based on social, economic, and legal factors."

Did I read that correctly?

A. Yes.

Q. Do you agree with ATSDR's assessment that sufficient evidence is lacking to determine a specific minimum exposure?

A. Well, specifically in the setting of

assigning -- as I mentioned, assigning a specific minimum exposure, because I think what the CDC and the ATSDR are acknowledging is that you can't really do that. You need to take in multiple aspects of medical literature and the science in order to come to a conclusion that only this 30-day minimum is based on social, economic, and legal factors.

Because scientifically speaking, it's not really something you're able to do, like you can do with medications that are coming to the market where there have been randomized controlled trials, that -- so yes, I agree with that, in the context of -- it's not something that can really be done in the setting of a known carcinogen.

Q. So a specific minimum exposure duration cannot be set by specific -- or strike that.

A specific minimum exposure cannot be set by scientific principles; fair?

MS. GJONAJ: Object to form.

THE WITNESS: No. That's not accurate. So you're -- you're talking in two separate things. So you're trying to make a generalized statement based on a statement that's made in the context of TCE, benzene, and PCE.

So in some cases, depending on the

exposure and depending on the substance that you're looking at, you can do that. You absolutely can do that. And we do do that for certain things. And it has been done in the past for different medications, et cetera.

But with the -- in the setting of a known carcinogen that's already known, where a disease -- you're looking at a disease that's already happened, you know, you can't -- the maximum contaminant level doesn't really apply.

It's basically meant as a public health risk assessment for people without disease. Here we're talking about people that have already developed the disease. So when evaluating those individuals, that are a specific subgroup of people that have been exposed and actually developed the disease, it's being able to go back and look at -- did they have an exposure level, in the setting of this particular context, or litigation, that would have been sufficient in establishing sufficient, in this context, which is what they say and what I agree to, is 30 days, based on all of the factors that have been looked at in not only the epidemiological studies that they evaluate in

their report, but, you know, as I've alluded to and -- and have addressed and talked about, the mechanistic data that you take into account when evaluating the weight of the evidence.

BY MS. HORAN:

Q. Going back to the first full paragraph, the second sentence reads: "The 2012 Honoring America's Veterans and Caring for Camp Lejeune Families Act established a minimum duration at Camp Lejeune of 30 days in order to be eligible for health benefits under the Act." Do you see that?

A. Yes.

Q. The next sentence reads: "It is unclear how the minimum duration was established for this legislation." Do you agree?

A. Well, I don't know how they established it, but I agree with -- that that's -- that you read it correctly, and that they go on to say that they can't disagree with it based on the epidemiologic studies that they addressed in this report.

Q. Okay. The next sentence says, "However, the evidence from the epidemiological studies included in this assessment is not sufficient to contradict this minimum duration."

I believe you just testified you agree to

that statement?

A. Yes.

Q. It says, "Moreover the results from the Camp Lejeune morality studies suggest that a 30-day minimum duration requirement may be appropriate since elevated risks for some of the diseases evaluated were observed for exposure durations of one to three months." Did I read that correctly?

A. Yes.

Q. Which -- or have you reviewed any of the Camp Lejeune morality studies?

A. "Morality"? You mean "mortality." Did you say --

Q. Correct. No, you're right. "Mortality." Thank you for that.

A. Yeah, yeah. Yes.

Q. Okay. Which mortality studies have you reviewed?

A. I believe their first author was Bove.

Q. And have you reviewed the mortality study that's on your -- cited in your report or on your "Materials Considered" list?

A. Yes.

Q. Do you know if NHL is one of the diseases where there may be an elevated risk at one to

three months' duration exposure?

A. Yes. That's my understanding.

Q. And that's your understanding based on what?

A. On the -- what their data was.

Q. In the mortality studies? Or are you -- who is "they"?

A. I have to -- I'm going to have to --

MS. GJONAJ: I'm going to object.

THE WITNESS: -- agree with you that --

MS. GJONAJ: If you're going to ask him about specific studies, I ask that you let him look at those studies.

THE WITNESS: That's what I was just going to say, is that I'd want to look -- there are a lot of studies that I reviewed. I would want to relook at them before I answer.

BY MS. HORAN:

Q. Sure. I'm just trying understand what -- you know, what your understanding is off the top of your head. And you know, we can -- I'm certainly not asking you about the details of any study. I'm happy to pull up any that you reference. I'm just trying to understand, sitting here today, kind of what your basis is.

And again, happy to pull up your report, if that would be helpful, or any other --

A. I think I'd rather -- yeah. So you asking me about the relative risk of a study is asking me to detail a study. So I would argue that, you know, in order to answer accurately and give my -- the correct opinion, I'd want to just rereview, because there are a lot of different studies that I reviewed.

Q. Okay.

Turning back to Exhibit 3, which is ATSDR, the last sentence says, "These results should not be surprising given that the levels of TCE, PCE and vinyl chloride measured or estimated in the drinking water systems at Camp Lejeune considerably exceeded their respective MCLs." Did I read that correctly?

MS. GJONAJ: What page are you reading from?

BY MS. HORAN:

Q. It's the same paragraph. It's the last sentence of the first paragraph.

A. Oh, of the first paragraph. I thought you said the last paragraph on the -- or the last sentence on the page. Yeah.

Could you say that again?

Q. Sure. "These results should not be

surprising given that the levels of TCE, PCE and vinyl chloride measured or estimated in the drinking water systems at Camp Lejeune considerably exceeded their respective MCLs." Did I read that correctly?

A. Yes.

Q. You agree that the ATSDR did not include benzene in that sentence?

A. Yes.

Q. The next sentence reads: "The studies evaluated in this report provide very limited information concerning the level or duration of exposure associated with an increased risk of a cancer or other disease." Do you see that sentence?

A. Yes.

Q. Do you agree?

A. With that sentence?

MS. GJONAJ: Object to form.

THE WITNESS: So I would say, looking at the studies, the epidemiologic studies alone, that yes, that is -- I would agree with that sentence.

But, you know, I think what you do as a general causation, to evaluate a level or duration of exposure, is you have to take into account how that exposure in the body causes

mechanistic effects that would lead to carcinogenesis.

So I would agree with that sentence with respect to the studies that were evaluated in that report. But when going into -- looking at the overall, you know, entirety of the data, I would say you have to take into account multiple things when trying to talk about an increased risk of cancer, more so than just level or duration of exposure.

BY MS. HORAN:

Q. Turning back to your testimony that exposure to TCE at 5 parts per billion over 30 days would increase your risk of developing non-Hodgkin's lymphoma, I believe you testified that that was based on the ATSDR report we just looked at, which is Exhibit 3.

MS. GJONAJ: Object to form -- sorry. I'll let you finish your question.

BY MS. HORAN:

Q. What else did you rely on for that assessment?

A. The Cohn study, C-o-h-n.

Q. Anything else? And again, I'm happy to pull up your report, if that would be helpful for

you.

A. So again -- and that's in combination with, you know, the plethora of data as kind of evaluated by IARC with respect to carcinogenicity of trichloroethylene. So, you know, just taking those numbers by themselves, you know, you don't necessarily have biological plausibility, just based on the specificity or the, you know, actual epidemiologic data.

So when coming to my conclusions, again, and I'm -- I don't mean to sound like a broken record, and I don't mean to keep repeating myself; but I mean, I just want to make sure that my testimony is clear that it's not just one thing I'm coming to, or just a couple studies that have talked about duration, or studies that have talked about, you know, levels of exposure that form my opinion that -- that can be a -- you know, cause, or in this case, at least as likely as not a cause of whatever malignancy -- in this case diffuse large B-cell lymphoma -- again, I'm -- I'm incorporating a lot of other studies that talk about carcinogenicity and, you know, immunomodulation, immunodeficiency, you know, free radical damage to, you know, lymphocytes, TNF alpha, interleukin 6 production by these free

radicals.

I mean, there's a lot of different things I'm taking into account, and not just the data that has specifically addressed time and duration and level. If that makes sense.

Q. In thinking through your general causation analysis, were you using "at least as likely as not" as your standard for determining causation of the different chemicals? Or what standard were you using? Are you using, I should say.

A. Yes. That is the standard that I addressed in my report that I'm using in this case.

Q. And where did that standard come from?

A. So when I was told about that standard, that that was the standard being used in this case, I did my own kind of independent research into that standard, because from my recollection, I know different courts have different standards for certainty as far as an expert witness testimony goes. And most of what I've been asked to do in the past has been to look at a case with the "more likely than not" as a standard, was a cause, et cetera.

But I wasn't asked to do that in this case, so I did not evaluate the literature in that context. So before I kind of got involved, I read

more about "at least as likely as not" and how that was the standard being issued, I guess, with Camp Lejeune and kind of the history behind that, and -- I think that that -- that's where I also, in addition to the article I cited about Goodman, came across, in looking into that, I believe, terminology that she used, similarly, if not the same, in some of her literature or data.

And the other word I heard, you know, used synonymously, or that I read used synonymously was "equipoise." So that was kind of what I did, when I first heard that phrase, as far as the -- the legal standard being used in this case.

Q. What level of exposure or amount is associated with an increased risk in developing NHL and PCE?

MS. GJONAJ: Object to form.

THE WITNESS: Could you say that again?

BY MS. HORAN:

Q. Sure. What amount of PCE is associated with an increased risk in developing diffuse large B-cell lymphoma?

MS. GJONAJ: Same objection.

THE WITNESS: Well, I would say with PCE, I don't think the data is as strong, because

it's not considered a known human carcinogen; it's a probable human carcinogen. And that's reflective of the fact that being able to separate that out has not been as easy as it for TCE or benzene or other volatile organic compounds.

And so -- but again, that same Cohn analysis -- from 1994, I believe -- also had elevated ratios associated with that same 5 parts per billion. And -- but again, with all of these, I am addressing your question with respect to the levels that have been associated with; but what we're dealing with here is a case where these individuals, including Mr. Vidana, have been exposed to several volatile organic compounds that were in the water.

And so in this case -- I mean, it's fine to ask, you know, an individual question about a particular, you know, carcinogen, or known possible carcinogen -- in the case of PCE, a probable carcinogen, I should say, in the case of PCE -- for human carcinogen, I should say.

But I'm looking at this case with respect to the weight of all of the volatile organic compounds and the fact that, as I testified

earlier, are at least additive if not likely synergistic in their effects with respect to carcinogenesis, including with diffuse large B-cell lymphoma.

BY MS. HORAN:

Q. Sure. And Dr. Michaels, your report goes -- has a subsection for TCE; it has a subsection where you look at PCE; and it has a subsection where you look at benzene. And you review epidemiological studies to determine associated increased risk with developing NHL or, in some instances, they are specific to diffuse large B-cell lymphoma. Am I reading your report correctly?

A. Yes.

Q. And I'm just trying to -- to kind of follow -- you've done the analysis per -- per chemical. And I understand your -- your ultimate conclusion is about an individual at Camp Lejeune. But I'm just -- I'm trying to understand the way you've done your analysis, which is to look at each individual constituent. Is that fair?

A. Yes.

Q. Okay. So you mentioned for PCE, the -- the Cohn study establishes about 5 parts per billion. Are there any other studies that you can think of

that supports an increased risk of exposure to 5 parts per billion of PCE?

MS. GJONAJ: Object to form.

BY MS. HORAN:

Q. And I'm happy to show you your report again.

A. Yeah. Again, not that I can recall off the top of my head.

Q. Okay. Would it be helpful for you to look at your report?

A. Yeah, it could. I could look at it.

Q. Let me pull it up.

So I'm putting back on this screen. This is Exhibit 1. And I'll turn to your section on PCE, which starts on page 9. And I can read you the question, if it would be helpful; or if you could just let me know which studies support the 5 parts per billion exposure with an increased risk.

MS. GJONAJ: Counsel, could you repeat what the pending question was? Sorry.

BY MS. HORAN:

Q. Sure. What studies support a 5 parts per billion exposure to PCE is associated with an increased risk in developing non-Hodgkin's lymphoma or diffuse large B-cell lymphoma?

MS. GJONAJ: Objection. Form.

THE WITNESS: You know, again, I don't see anything that specifically talks about the 5 parts per billion. But again, my analysis, as I've mentioned before, the -- I think it's -- it's difficult to -- if not impossible, in this setting -- to come up with any sort of known threshold for any of these, because you go based on, you know, various aspects of the biology, the biologic plausibility and what few epidemiologic studies have, and most of them cannot -- are not able to quantify it to that degree. It's often -- more often duration than actual amount or level.

BY MS. HORAN:

Q. And what duration of exposure to PCE is associated with an increased risk in the development of non-Hodgkin's lymphoma or diffuse large B-cell lymphoma?

MS. GJONAJ: Object to form.

THE WITNESS: Well, again, I would say 30 days would be -- is generally accepted, based on these studies.

BY MS. HORAN:

Q. When you say "these studies," what studies

are you referring to?

A. Well, again, like -- kind of going back to the ATSDR. You know, they have addressed this. And agree -- and I'm not disagreeing with the ATSDR that based on their analysis and my also understanding and relying on their report, that 30 days is, in the context of the carcinogens we're talking about here, knowing the underlying mechanistic causation of the -- the carcinogen -- carcinogenesis that's caused by these, that it's an appropriate number to use, given the limitations of being able to come up with an appropriate number.

Q. Anything beyond --

A. So -- say that again?

Q. Oh, I didn't mean to cut you off. I didn't know if you were done.

But I was going to ask, anything other than the 2017 ATSDR assessment of the evidence that we've looked at?

A. Again, by definition, it's the assessment of the evidence. So the CDC is doing an assessment of the evidence. So when you ask me if I agree with such-and-such organization or such-and-such documentation, in this example I'm agreeing with their assessment of the evidence, that their

researchers did, that I had -- in the few reports that have specifically identified -- have been able to identify those timelines, seem to support that evaluation and that assessment.

Q. I'm turning on Exhibit 1 to page 10, which is where your section on benzene begins.

And what level of exposure to benzene is associated with an increased risk in the development of diffuse large B-cell lymphoma?

If you have --

A. Well -- sorry. Go ahead.

Q. I'm saying, if you have an opinion on that. I don't know if you do.

A. Well, there's a -- one of the studies that I talked about -- I think it was the Swedish study --

Q. Would you like me to turn to the next page?

A. Yeah, I think by Nilsson, where they looked at workers with at least one month of an exposure history. That was one case where they looked at the timeline of exposure. But that's the limitation of, you know, these studies. And it could have been earlier than a month. But that's, you know, the earliest time period.

So it's really dependent on how these

epidemiological studies are organized and their own particular methods. But that -- they have, you know, one month as being a minimum exposure, that those seamen exposed to cargo vapors from -- from gasoline and other petroleum products that contain benzene had a significantly increased risk of non-Hodgkin's lymphoma.

Q. And do you have -- so you discussed amount -- or strike that.

You've discussed duration, and you cited to this Nilsson study, which is footnote 46 on your report. Do you have any opinion on the amount, the level of benzene one would need to be exposed to that would be associated with an increased risk in developing diffuse large B-cell lymphoma?

MS. GJONAJ: Object to form.

THE WITNESS: Well, again, it's -- it's -- I mean, there's not -- I mean, other than -- you know, and I'm not -- as I've already mentioned, I'm not relying on the maximum contaminant level, which I believe is established as 5 parts per billion or 5 micrograms per liter, but -- because that has a separate -- very separate connotation for public health risk assessment.

But there was nothing in the literature

that I saw to disagree with -- with that level. And again, the duration of 30 days, in combination with all the other mechanistic data, is being associated in patient -- in these particular individuals with an increased risk of non-Hodgkin's lymphoma.

MS. GJONAJ: Counsel, just -- whenever it's a good time, if I could -- we could take a short break for the restroom, whenever --

MS. HORAN: Let's go right now. That's fine. Let's go right now.

THE WITNESS: We're going off the record at 11:46 a.m.

(A recess transpired from 11:46 a.m. until 11:57 a.m.)

VIDEOGRAPHER: Back on the record at 11:57 a.m.

BY MS. HORAN:

Q. Dr. Michaels, I'm going to pull back up your expert report, which is on page -- I put on the screen page 7. Do you see that?

A. Yes.

Q. Okay. The main paragraph in the middle, the full paragraph in the middle of the page, the last sentence reads: "The current U.S. MCLs for TCE,

PCE, and benzene are 5 parts per billion, but only 2 parts per billion for vinyl chloride. The concentrations present in the water during Mr. Vidana's time there were well in excess of the MCLs." Did I read that correctly?

A. Yes.

Q. What is an MCL?

A. It's a maximum contaminant level.

Q. And do you know how an MCL is determined?

A. I don't know the baseline for how it's determined, like the underlying science or data that goes into determining it, other than evaluation of whatever studies are available at the time. But as I've alluded to, and specifically testified to, it's not something that is used in the context of causation assessment, only because an MCL's meant to be a -- basically a public health risk assessment for people that do not have evidence of the disease, which doesn't apply to someone that's already been diagnosed with a malignancy associated with whatever MCL carcinogen or chemical we're talking about.

Q. Why include MCLs in your report, then?

A. As a background for the levels that have been established for what's considered increased risk. But, you know, only as a background to, you

know, what the levels we're talking about, the chemicals that we're talking about are.

Q. Do you know what time period is used in order to assess an MCL?

MS. GJONAJ: Object to form.

THE WITNESS: I don't know what you mean by "time period."

BY MS. HORAN:

Q. Do you know how long one would have to be exposed to the amount of an MCL in order for there to be an increased risk? Do you know what time period they considered?

MS. GJONAJ: Object to form.

THE WITNESS: I don't know what's -- if that's uniform for each substance that you're talking about, or if that's something that varies depending on the substance.

BY MS. HORAN:

Q. Sure. So you're just not sure?

A. In that context, I think it would depend on what you're talking about.

Q. Do you know what time period one would have to be exposed to TCE at 5 parts per billion in order to have an increased risk such that they determine to set the MCL at 5 parts per billion?

A. Well, again, that's -- that's not the scope of what I evaluated in this context. Because as I just testified to, I'm not really using MCL to assign causation. I'm using Mr. Vidana's exposure to multiple volatile organic compounds, the fact that those have substantial mechanistic data that causes initiation of carcinogens through a variety of mechanisms, in addition to promotion of malignancies including non-Hodgkin's lymphoma, through a variety of mechanisms.

So it's not something that I focused on for the purposes of -- of this report, or plays any part into me forming my opinions in this specific case.

Q. Sure. And so you don't know.

A. I -- I just answered the question.

Q. Okay.

A. That it's not something that I -- I haven't memorized every single aspect of -- of toxicology or environmental science. It's -- it's not something that was necessary to come to my opinions and conclusions in this case.

Q. You state -- the second sentence that I read was "The concentrations present in the water during Mr. Vidana's time there were well in excess of

the MCLs."

Why did you compare the concentrations present during Mr. Vidana's time there to --

(Noise disruption.)

A. It was just a factual sentence. It wasn't meant to -- it was just simply meant as a reference point, but not that it meant anything more than that in the setting of causation in this case.

Q. Okay. So you're not relying on the MCLs for any type of determination of Mr. Vidana's causation? The causation of Mr. Vidana's NHL, I should say.

A. That's correct. I'm relying on a combination of the weight of the evidence that I've gone over, including the amount of the chemicals that were in the water while he was there, the number of days that he was on base, the number of exposure events he would have had, the mechanistic data with respect to all of the initiation and promoting properties of these particular chemicals. I'm relying on everything to form my opinions.

Q. The 2017 assessment of the evidence that you've cited on page 7 of your report, have you read all of the studies cited to in that assessment?

A. Could you say that again?

Q. Sure. On page 7 of your report, which is on the screen, you cite to the 2017 assessment of the evidence. It's also been marked as Exhibit 3. Do you know the document I'm talking about?

A. Yes.

Q. Okay. Have you read the studies that are cited in that assessment?

MS. GJONAJ: Object to form.

THE WITNESS: Some of them. Not all of them, because not all of them deal with non-Hodgkin's lymphoma.

BY MS. HORAN:

Q. Have you read the studies related to non-Hodgkin's lymphoma that are cited in the 2017 assessment of the evidence?

A. I would -- my -- my opinion is that I've read most of them that I've gone through. So -- but there were several -- many that had nothing to do with non-Hodgkin's lymphoma that I could see.

But most of them, I did.

Q. And the ones you reviewed would be on your -- either directly cited to in your report or on your "Materials Considered" list?

A. That's correct.

Q. People with no exposure to TCE, PCE, or

benzene can still develop diffuse large B-cell lymphoma, correct?

A. Yes. As I spent quite a bit of time talking about earlier, there are a variety of causal risk factors for diffuse large B-cell lymphoma that -- diffuse large B-cell lymphoma is not a malignancy that is specific to TCE, PCE, or benzene exposure.

Q. You've mentioned the potential synergistic or additive affects of PCE, TCE, and benzene a couple of times today. What analysis did you do to come to your determination that the chemicals are potentially synergistic?

A. Well, that's based on my overall general review of the literature and known carcinogenicity with respect to volatile organic compounds, that that's something that is generally accepted in the medical community with respect to compounds that have initiation capabilities in the sense of carcinogenesis with respect to radical oxygen species formation, secretion of tumor necrosis factor alpha and interleukin 6, immunosuppressive effects. That's something that is not disputed in the medical literature.

So that's -- and there are -- a lot of

those are done based on in vitro studies and in vivo studies, looking at the individual effects on particular mutation analysis, numbers of mutations, amounts of free radicals, et cetera, comparing, you know, one cell type versus another with sole exposure, sole exposure, and then looking at combined exposure.

So that's something that is, I think, well-published and known in the literature.

Q. Do you agree that the exact relationship between the interactions of TCE, PCE, benzene, and vinyl chloride is not known?

A. Yeah, I would --

MS. GJONAJ: Object to form.

THE WITNESS: I would say that, you know, it's -- there are very, very few chemicals that I know of where the exact interaction with other chemicals is known. That doesn't stop you from coming to a conclusion that those chemicals do work as a synergistic manner to cause a malignancy.

Like we know, for example, smoking is a strong risk factor for lung cancer. We know that asbestos is a strong causation risk factor for mesothelioma and lung cancer. And we also

know that when you put those two together, it has a synergistic effect to cause lung cancer at higher rates than either of them can do alone, but we do not know how that happens. But we do know that it happens, based on both epidemiologic studies and in vitro studies, and that doesn't stop us from drawing the same conclusion just because we don't know all of the aspects of how they interact together.

BY MS. HORAN:

Q. I'm pulling back up Exhibit 1 which is your report, and I've turned to page 14. Do you see that?

A. Yes.

Q. I believe this middle paragraph is where in your report you talk about synergy of the chemicals. I'm happy to go elsewhere if I missed it somewhere else, but I think this is where you cite to it.

And the first sentence of that reads: "A significant fact to incorporate into the findings in this case in the context of literature assessing non-Hodgkin lymphoma, including DLBCL, risk and exposure to individual chemicals, is the known impact of exposure to numerous chemicals simultaneously that

can have a synergistic effect with respect to carcinogenesis."

Did I read that correctly?

A. For the most part.

Q. What did -- did I say -- did I miss a word?

A. No, just your pronunciation. But yeah, you read it correctly.

Q. Okay. Well, I apologize for that. But --

A. That's okay.

Q. At least the words speak for themselves on the page.

A. Yes.

Q. And your support for this is the increased risk seen in many Camp Lejeune-specific studies and the 2016 Bulka study. Is that fair?

A. Well, that's in support of that increased risk. But there -- as I mentioned, there's more that's -- you know, there's hundreds of articles in the literature about the synergistic effects of these types of -- and including these compounds -- with respect to other experimental analyses that have been performed.

So yeah, that -- those results support the statements that I made.

Q. Has that analysis been done for the contaminants here: TCE, PCE, benzene, and vinyl chloride?

A. Well, again, like they've been done -- I don't know -- I can't point to a specific reference as I sit here and try and recall where all four of them and all four of them alone were looked at. But there are innumerable articles, when I did my literature search, that specifically look at combinations of several of them with each other.

But that's why -- even having all of them together adds that additional layer of synergy that maybe an individual one alone, you know, wouldn't be as significant.

Q. Your second sentence says: "In support of this are the increased risks seen in many of the Camp Lejeune-specific studies, where those individuals exposed to contaminated water containing elevated levels of numerous known carcinogens." Do you see that sentence?

A. Yes.

Q. And you say that there's an increased risk in many of the Camp Lejeune-specific studies, but that increased risk wasn't universal across all Camp Lejeune studies; fair?

A. Well, it wasn't universal upon every specific subgroup that was looked at. But there were also very significant limitations to the study analyses that would have biased those results towards the null. But for the most part, looking at all of the studies, you know, whether they were statistically significant or not, many of them had -- if not most of them -- had an increased risk when evaluating non-Hodgkin's lymphoma.

Q. Did the fact that that increased risk from the Camp Lejeune studies was not true against -- at all times -- counsel against a synergistic relationship?

A. No.

MS. GJONAJ: Object to form.

THE WITNESS: No, it doesn't.

Again, it would depend on the study design, and the -- the way -- mainly the study design and how it was -- how those patients were evaluated.

For example, in the more recent Bove study, looking at the age of the patients, they -- like the mean age for the Marines, I think, was like in the mid to late -- 57, 56, maybe. Median or mean was 56 or 57, which is

very young for a study looking at an end point of a diffuse large B-cell lymphoma; that is normally something that you see in patients in their mid to late 60s.

And in fact, my recollection from that Bove study is that less than 1 percent of patients were over the age of 70 that were Marines. That, in and of itself, would markedly diminish the ability to find any sort of significance in looking for a malignancy that mainly occurs in elderly patients. And it can occur at any age, but it dramatically increases as a patient ages and as their immune system gets weakened by whatever the cause; if it's not TCE or PCE or benzene, it's, you know, natural decreasing immunity.

But, you know, Mr. Vidana was in his 40s when he was diagnosed, but that's, you know, not typical of diffuse large B-cell lymphoma as a whole. So that has to be taken into account when looking at the statistics, because if you did a study of smokers that were -- started smoking when they were in their 20s and then you looked at them in their 40s, you are most likely not going to see malignancies in those patients

because it's something like diffuse large B-cell lymphoma that takes years to develop after exposure to a carcinogen.

So that's -- again, that's something where you have to take everything into account, knowing the underlying biology of the malignancy that we're looking at -- in this case it's diffuse large B-cell lymphoma -- knowing how that particular exposure will cause a malignancy, as I alluded to before, with -- with malignancies that are, let's say, hormone receptor positive.

If you're looking at a hormonal exposure and you had a hormonal exposure 30 years ago for a year and then they develop a hormone-positive tumor 30 years later, not in the context of that medication that was a hormone, that's something that would less likely be associated with that malignancy.

But when you're talking about a carcinogenic substance that causes genetic mutations that can then take many years in order to manifest into malignancy, that's something that's -- you have to take into account when looking at these.

It's -- again, it's the weight of the evidence. It's knowing the biology. It's knowing the underlying mechanistic data. It's incorporating the -- the epidemiologic studies that have been done and also accepting their weaknesses and how the weaknesses in the studies may impact the results that you're seeing.

So, you know, it's -- again, it's -- you have to take all that into account when looking at these studies and saying whether a synergistic effect, whether present or not, would have manifested by the time those results would have been published.

BY MS. HORAN:

Q. Does misclassification bias always tend toward the null hypothesis?

A. No, not always. But non -- nondifferential exposure bias in this case, as Bove went into, would more likely bias towards null in this example, but not necessarily in any given study. But I believe that the authors specifically mention it and say that it's -- in this example, because of misclassification of who was really exposed and who wasn't and the fact that there were likely nonexposed people in the exposed group, that in this case it

would, more likely than not, bias towards the null.

Q. Are you offering an opinion on -- or strike that.

Why is -- why is that nondifferential?

A. Because there are patients that have -- I believe that was a term that they used in Bove, but we could pull that up. Because I was specifically referencing the misclassification bias in that case -- or in that article.

Q. Okay. I think we'll probably get to some of the Bove studies a little bit later, so we can -- when we get there, we can take a look, if that's helpful to you.

Are you offering an opinion on the latency period of diffuse large B-cell lymphoma after first exposure?

A. Only in the sense --

MS. GJONAJ: Object to form.

THE WITNESS: Only in the sense that it varies, based on what you're talking about, the kind of exposure in the literature, like whether it's --

BY MS. HORAN:

Q. So you're not -- (audio distortion) offer that opinion in your report?

A. Sorry, am I getting cut off -- did I get cut off? Can you hear me?

Q. I can hear you. I -- I thought you were done answering. But I guess -- please finish your response.

A. Well, I don't -- could you repeat the -- the question?

Q. Sure. You're not offering an opinion establishing a latency period in your opinions in this case, are you?

MS. GJONAJ: Object to form.

THE WITNESS: Well, I wasn't asked to specifically talk about the latency. But it was -- in this case, the latency is consistent with what I know about diffuse large B-cell lymphoma and his exposure.

BY MS. HORAN:

Q. Okay. And we'll get to that a little bit.

I want to turn back to your report, and in addition to the -- let me put it back on the screen. This is Exhibit 1, and we're on page 14.

In addition to the Camp Lejeune studies, you cite to the -- the Bulka 2016 study, is that correct, for your -- in support of your opinion that the chemicals are synergistic? Is that fair?

A. Yes.
Q. Okay.
MS. HORAN: I'm not sure why, but these are not -- but the study is not pulling into the chat.
Diana, do you mind if we just go on the screen, or can we go offline so I can try to figure out what's going on?
MS. GJONAJ: What study is it?
MS. HORAN: It's the Bulka study. It's 2016. It's cited in his report.
All right. I'm not sure why this one won't pull over.
MS. GJONAJ: All right. I'm just seeing if I can pull it for you.
(Exhibit 4 was marked for identification.)
MS. HORAN: Oh, it'll open on my computer. I just can't seem to drag it into the chat.
In the meantime, I'm marking as Exhibit 4 -- this is a study titled "Relations Between Residential Proximity to EPA-Designated Toxic Release Sites and Diffuse Large B-Cell Lymphoma Incidence," from October of 2016. And the lead author is Catherine Bulka.
MS. GJONAJ: And if it's okay with you,

I'll just copy the link into the chat in case he needs to look at it. You can confirm that it's the same --

MS. HORAN: Yeah, absolutely. That's -- thank you for -- I'm not sure what happened there.

BY MS. HORAN:

Q. Dr. Michaels, do you see the Bulka study that you cited in your report on this screen?

A. Yes.

Q. Okay.

The conclusion on page 1 reads: "Proximity to Toxics Release Inventory sites can be linked to increased DLBCL risk as assessed through focal clustering and Poisson regression, and confirmatory studies using geospatial mapping can aid in the further specifying risk factors for diffuse large B-cell lymphoma." Do you see that?

A. Yes.

Q. And I think I said "diffuse large B-cell lymphoma," but it's actually just "DLBCL."

A. Right.

Q. How does increased clustering near sites support synergistic relationship of the contaminants?

A. Well, I need to rereview. I haven't

reviewed this article in a while, so I'll need to rereview the article.

Q. Okay.

Dr. Michaels, are you rereading the -- the whole study? Or . . .

A. I'm rereading parts of the study.

Q. Okay.

A. I have it pulled up on my end.

Q. Okay. Understood. Would you -- would you mind just letting us know when you're -- you're done?

A. Sure.

So I'm done reviewing the parts that I wanted to.

So in this case, it's not just that it's -- it's not that it's, you know, the last sentence you read about the focal clustering, that it -- that's indicative of a synergistic response. It's that they were looking specifically at these different toxic chemicals that are released in the distance from the Toxics Release Inventory facilities, that these patients were developing diffuse large B-cell lymphoma.

And so many of these chemicals that they're evaluating in the literature alone have not been associated with malignancies necessarily, or

specifically non-Hodgkin's lymphoma, or have been looked at with diffuse large B-cell lymphoma; but it's the presence of all of them and finding statistical significance in this that draws me to the conclusion -- again, in the context of everything else I've talked about, in all of the other in vitro studies that have been done looking at various compounds -- that would support these chemicals in Camp Lejeune acting as synergistic effect.

So it's not just anything -- one -- one specific thing that they evaluated in this study. It's taking this study in the context of everything else.

Q. Turning to page 5, do you see this "Discussion" section at the bottom of the page?

A. Yes.

Q. Okay. The first sentence reads: "Numerous studies support associations between occupational toxic exposures and NHL incidence, although considerable controversy remains regarding residential exposures." Did I read that correctly?

A. Yes.

Q. Do you agree that considerable controversy remains regarding residential exposures?

A. Well, I didn't study residential exposures

in the sense of -- you know, they -- they reference De Roos, talking about residential proximity to industrial facilities, you know, match geographical areas, study, you know, in -- in Spain residential proximity to industrial plants.

That's -- a lot of that doesn't have to do with contamination of water. So I didn't study like industrial exposure. I evaluated -- and so I don't really have a comment on that. What I evaluated was actual known consumption of water that is known to be contaminated, which is very different than that sentence. And it's not something that I specifically looked at. I was looking at it only in the context of Mr. Vidana.

Q. Sorry. Strike that.

Are you -- was Mr. Vidana exposed in a residential setting? Or are you -- did you only study Mr. Vidana as exposed in an occupational setting?

MS. GJONAJ: Object to form.

THE WITNESS: So what I am drawing a distinction to is that if you want to pull up the references that -- where 5, 23, and 24, then we can evaluate that sentence and the footnotes, as it's written. Because this is not -- these

are not individuals in those three references that were drinking known contaminated water. Those are people that may have been exposed because they are in the vicinity, because they live in the vicinity of an industrial facility.

It's completely different, completely different than what we are talking about here. This is an individual -- individual who may have been living on a base and -- and traveling to, you know, different acts -- or was traveling to different parts of the base that are likely contaminated with significant -- significant amounts of the carcinogens that we've been talking about.

This is not someone that may or may not have been exposed in -- with a nearby power plant, where there were substances being emitted in the air that -- whether -- and these cases -- these are not patients -- and you know, the references 5, 23, and 24, if you want to bring them up, my assessment and my analysis of that -- of those references is that those are not patients that were actually drinking known contaminated water.

So it does not apply, and it's not

something that I specifically looked at with respect to possible exposure based on proximity to an industrial site. It's -- it's not what we're talking about in this case.

BY MS. HORAN:

Q. Turning to page 6, do you see the last paragraph?

A. Yeah.

Q. "Another potential weakness of our study was the lack of quantitative exposures and temporal analyses." Did I read that correct?

A. Yes.

Q. Dr. Michaels, association is not the same as causation, correct?

MS. GJONAJ: Object to form.

THE WITNESS: So not every association is a cause. That's correct.

BY MS. HORAN:

Q. And generating an opinion on causation is not as simple as just having a study that shows a statistically significant association between a substance and a disease; fair?

MS. GJONAJ: Objection.

THE WITNESS: Of course not. Yeah.

BY MS. HORAN:

Q. So, for example, it's possible to have a study showing a statistically significant association between a substance and a disease, and still not be able to conclude that the substance can cause that disease. Right?

A. Yeah, you're -- I mean, this is like simplistic questioning that has nothing to do with -- as what I've been testifying to for three hours, which is that -- you know, that's not something that I did, and that's not something that you do.

If you're going to assess whether a particular substance is a cause, as I've said probably over a dozen times now, you take the weight of the evidence, and you don't take any one particular result. You have to go based on mechanistic data, epidemiology, biological plausibility, knowing how, you know, carcinogenesis plays into effect in that particular substance, how many substances were involved, what someone's exposure level was, et cetera.

There's not just one thing that you go to with respect to specific causation when trying to determine the cause, or a cause, or potential cause of a malignancy. There are lots of things you go to,

and you don't just ever take one particular statistical significance from a study and draw conclusions based on that.

Q. The authors of an epidemiological study, they provide statistical results that indicate a level of risk that's observed in that study; fair?

A. Could you repeat that?

Q. Sure. The authors of an epidemiological study provide statistical results that indicate the level of risk that they observed. Is that fair?

MS. GJONAJ: Object to form.

THE WITNESS: The -- are you asking a general question? I don't know if you're talking about Bulka or . . .

BY MS. HORAN:

Q. Yes. No, I'm sorry. Did I take -- yeah, no. We're done with Bulka. I'm just asking generally if -- your opinion on that, and I'm happy to repeat it.

A. Yeah, could you repeat it?

Q. Sure. And Dr. Michaels, I understand the -- your weight of your evidence, but we're just going through to understand kind of how you weigh the different pieces and the limits of how you do it. So, you know, understanding the different pieces, I

understand that you've weighed much to get to your final conclusion, but that's just what we're doing here.

So the question I asked was, the authors of an epidemiological study provide statistical results that indicate the level of risk that they observed. Isn't that fair?

A. I would say, generally speaking, that's one of the things that they do in an epidemiological study.

Q. And it's not possible, from this information alone, to say whether any particular case of disease in a study was caused by the exposure versus some other risk factor. Fair?

A. Yes, some -- some studies are better than others in excluding -- or trying to exclude other confounding variables. And it would depend on how the study is done and the power of the study. But again, when assessing -- the whole reason for the study is to fight against the concept of anecdotal evidence, just based on one patient in a clinic. And so the more -- the more studies show, the greater number of subjects, the less likely a result is going to be found to be inaccurate.

But it -- again, in the sense of assessing

causation for any individual disease that arises within any individual epidemiologic study, there's no way to know with 100 percent certainty whether that disease, from that subject, was caused by the exposure. That's why you have to go based on all of the other data when evaluating the overall weight of the evidence.

Q. And the risk ratio indicates the level of association that's observed there?

A. In that particular study, based on whatever limitations or strengths of the study, yes, that's generally how it's interpreted.

Q. And 1.0 indicates no association?

A. Generally a 1.0 -- yes. Generally, that's what it indicates, is no association with that particular parameter.

Q. And what level of increased risk reflects a modest association, in your view?

MS. GJONAJ: Object to form.

THE WITNESS: Well, again, it's -- I wouldn't -- it would depend on the study, and it would depend on -- it would just depend on the study and how the study is performed.

I -- I wouldn't -- you know, subclassify it as modest, mild, marked, in that setting

without knowing the other co-variables of the study, and what the study was specifically looking at, and the limitations of the study, and the confidence intervals.

I think it's hard, just in a vacuum, to say that a particular relative risk of say 1.2, or whatever, would increase -- would cause you to say that there's a moderate increased risk or moderate increased association in that particular parameter.

BY MS. HORAN:

Q. So in your opinion, it's very study-specific to determine whether there's a modest or sizeable -- or whatever you want to characterize it -- association? It's very specific to the study?

MS. GJONAJ: Object to form.

THE WITNESS: I would say it varies, based on -- you know, some authors have set different -- different parameters on what they consider modest, what they consider marked.

I would say a lot of people use 1.2, but I don't think that that's a uniform. I don't think there's anything uniform in the scientific literature that says a relative risk or odds ratio or hazard ratio, or whatever, of X number

corresponds to a moderate risk. I think it's very study-dependent.

BY MS. HORAN:

Q. Confidence intervals evaluate how precise that risk assessment is. Fair?

MS. GJONAJ: Object to form.

THE WITNESS: I would say that's one of the -- the elements that goes into assessing how precise the risk is.

BY MS. HORAN:

Q. What else does a confidence interval do besides evaluate how precise the risk estimate is?

A. Well, it can show you -- you know, it can be indicative of the power of the study, the -- the small numbers of the study, but it doesn't necessarily mean that it's imprecise. It could just be based on the overall study design.

It doesn't mean, if you have a wide confidence interval, that it necessarily completely takes away or minimizes the results of the study. I think, again, you have to take -- if you only have a few cases, you're going to to have a wide confidence interval. That doesn't mean that it was necessarily imprecise.

Q. A confidence interval that includes 1, or

the null, suggests no association; is that fair?

A. No. It's not fair.

Q. Why not?

A. Because that's too simplistic. I mean, you don't -- you don't go based on -- if it includes 1, that doesn't mean that you would throw out those results. Bradford Hill -- that was part of a whole Bradford Hill analysis.

If there's a general trend, that doesn't mean there's no association. That means you take -- you -- in that particular case, it's not statistically significant. That doesn't mean that there's no association. You have to take all of the results and look at them in tandem, or together.

For example, we do this constantly in the laboratory, where there's something called "Westgard rules," where we look at proficiency testing to make sure that our analytes are functioning property -- or properly, and our machines that we're using -- and if you have several in a row that are not outside of the confidence interval, the 95 percent, you know, confidence interval, but there's several in a row that are maybe one standard deviation or greater, that -- on one side of the curve.

So say, for example, you have multiple

studies that have shown that diffuse large B-cell lymphoma or non-Hodgkin's lymphoma, or whatever malignancy, has a relative risk of 1.3, 1.4, 1.2, and none of them are, by themselves, statistically significant, that's not something to dismiss. That's something that in the lab, when we have several that are on one side, that's something to alert us that there could be a problem with the analyzer or the analyte that we're looking at, because there is a trend towards an abnormality or a trend towards a skewing of the data or a skewing of the analyte, in the case of the lab.

And we do that in the literature as well, where again, depending on the power of the study, depending on the confounding variables, depending on the methods that are used, you may not, in any individual study, be able to have a confidence interval that doesn't include 1, but it's -- it shows an increased relative risk or an increased hazard ratio.

And when you see multiple of those, combined with what you know about the biological plausibility or the temporality of the exposure, whatever, allows you to come to a general conclusion about causation, whether it's, you know, at least as

likely as not, or some other standard.

So it's something where you have to take everything into account. And so I wouldn't just automatically answer your question by saying it's something as not -- includes 1 in a confidence interval, that there's no association, because it's not that simplistic.

Q. Okay. For a particular study, if a confidence interval includes 1 or the null, does it suggest that for that study, there's no statistically significant association? Is that fair?

A. It says that for that study, that particular parameter is not statistically significant. For that study.

Q. Okay. When the odds ratio increases as exposure increases, you can be more confident that an association is present. Is that fair?

MS. GJONAJ: Object to form.

THE WITNESS: I would say that depends on what association, what kind of parameters you're looking at. Basically you're talking about a -- a dose response, and a lot of times you don't have the luxury of having a study designed based on the numbers, or based how -- on the study design, on being able to separate those exposure

categories to the level that you would see a dose response.

So when you have a study that does not have a dose response, I don't think that necessarily changes anything.

BY MS. HORAN:

Q. If you have a study that shows no dose response, you said that doesn't change anything. What did you mean by that?

A. Depending on the study. You have to look at the study design. You have to look at the numbers of people that were in the different groups. You have to look at how they were assigned to those groups. And if there's only a few people in the high-dose group and then there's 50 people in the low-dose group and 100 people in the medium-dose group, or whatever, you may not see it -- you may see it go up, and then it goes down, because of those two people that were in the high-dose group that maybe didn't have disease, or whatever. Like -- you have to look at the entire study before you make an evaluation about whether dose response in that study is valid or not.

Q. Other than the number of people in each dose group, what else would you look at?

A. How they were assigned to those dose groups. So how were they determining the exposure? Is it based on self-reporting? Is it based on, you know, location somewhere? Is it based on prescription data? You know, is it based on job title? Is it based on duration?

Like there's all these different things you need to look for when incorporating or trying to come to an evaluation about whether the presence or absence of a dose response is meaningful.

Q. You mentioned whether the exposure was self-reporting. Is it -- what's the relevance of that? Is it -- become less reliable if it's self-reporting or less trustworthy than other means of determining exposure or what -- what's your assessment of -- of a study that is self-reported?

A. Well, it --

MS. GJONAJ: Object to form.

THE WITNESS: It depends. So it depends on what you're talking about. So in the setting of certain medications, if they're over the counter, you often have recall bias, where someone -- whether it's a medication or an over-the-counter, you know, product that once someone has the disease, they may recall

something, you know, because they have the disease, and they now are more aware of it.

And they might think that, "Oh, well, you know, yeah, I was -- I took that, you know -- I used that product for four years," where someone who used it four years -- for four years, 30 years ago, who didn't develop the disease, maybe would not have thought about it.

So sometimes it's -- it's helpful, but it's -- there's always the potential for recall bias. And so it really just depends on the study, and what people can recall, and what you're talking about. If you're talking about malignancies, you know, sometimes if you don't have medical records and a person is supposed to report their malignancy and say, "Oh, yes, I had ovarian cancer," well, maybe they didn't really have ovarian cancer, and they actually had endometrial cancer, and their understanding was that it was ovarian cancer.

So it really depends on -- on what you're looking at to be able to say whether that would have an effect on the quality of the data or not.

BY MS. HORAN:

Q. Going back to Exhibit 1, which is your expert report -- do you see it on the screen?

A. Yes.

Q. Your general causation opinion, is that found in Section VII of your report?

A. Well, again, this was a --

MS. GJONAJ: Object to form.

Sorry.

THE WITNESS: This was a specific causation report. I have general -- I have statements in there that reflect general causation, but this is a specific causation report for Mr. Vidana.

And as I mentioned earlier, and addressed earlier, I did review other general causation reports from the Plaintiffs, including Bird and Felsher, et cetera; and while I didn't -- everything that they say in their reports I confirm in my assessment. I didn't necessarily rely on them to form my opinions. I did my own independent research. And all of the opinions that they expressed in their reports I agree with.

And so I wouldn't really say that there's

a -- a section of my report that specifically points out general causation, because this is a specific causation report that happens to deal with issues that maybe are applicable to general causation.

BY MS. HORAN:

Q. Sure. I think you just said you did your own analysis to determine if you agreed with their general causation opinions; fair?

A. Well, in the -- in the context and in the process of going through my own evaluation of the literature, and then reviewing their general causation reports, the opinions that they expressed in their general causation reports are opinions that I agree with.

Again, I'm not relying on things that they put in there that -- you know, studies and examples of data that they put in their analysis of the literature and assuming that it's correct. I did my own independent literature search. I did my own independent evaluation of the -- of the analyses that they also happened to reference.

And I agree with what is in their reports, but I'm not relying on their reports solely to form my opinions that happen to relate to general

causation, because this is a specific causation report in relationship to Mr. Vidana.

Q. Okay. So there's no section of your report that includes general causation analyses and opinions, the -- the part you did on your own?

A. The part that I did on my own has opinions that are -- not every sentence in everything that I wrote is applicable -- or is specific to Mr. Vidana. So there are going to invariably be aspects of my report that are applicable to a general causation opinion. But this is a -- as it's written on there, it's a specific causation expert report of mine.

Q. The independent analysis -- or strike that.

Were you aware that this case has expert discovery phase such that general causation was Phase II and specific causation is Phase III?

A. I'm not an attorney, so I don't know the legalities of -- of phases. I just know that this is -- that my report that I did, I did it on the timeline that I was asked to do. I evaluated the literature independently. I reviewed general causation reports. And I came to my own conclusions that include -- that are present in this specific causation expert report of mine.

Q. Turning to page 1 of your report, you have a "Summary of Opinions" on page 1, and it goes into page 2. Do you see that?

A. Yes.

Q. Okay. And these are the summary of the opinions you intend to offer at trial?

A. Again, these are opinions that I still hold as I sit here today. But again, at trial, whatever I'm asked, if it's an opinion -- if it's a subject that I have an opinion on, based on my review of the literature and my report, then it's something that I would testify to.

Q. Your first opinion is that "Jose Vidana was diagnosed with diffuse large B-cell lymphoma in October of 2007." Did I read that correctly?

A. You read that correctly.

Q. Mr. Vidana's pathologist determined he was diagnosed with diffuse large B-cell lymphoma; fair?

A. Well, I think the term -- you know, again, as I've mentioned, the terminology has changed. But I think they -- they actually said "large B-cell lymphoma," but it was basically analogous to diffuse large B-cell lymphoma, based on the immunophenotype that they reported in their pathology report.

Q. And you agree -- do you agree with

Mr. Vidana's pathologist on his diagnosis?

A. I didn't review -- I don't think the slides were available. But based on everything that I was able to evaluate, I have no reason to disagree with it.

Q. So you reviewed the pathology report but not the slides; fair?

A. Correct.

Q. And you -- to the best of your understanding, is Mr. Vidana's diagnosis in dispute in this case?

A. Not that I'm aware of.

Q. You're not offering an opinion on Mr. Vidana's treatment or whether it was appropriate; fair?

A. That's fair.

Q. Your second opinion is that "Diffuse large B-cell lymphoma is a subtype of non-Hodgkin lymphoma." Did I read that correctly?

A. That's correct.

Q. And it's not in dispute in this case that diffuse large B-cell lymphoma is a subtype of non-Hodgkin's lymphoma; fair?

MS. GJONAJ: Object to form.

THE WITNESS: That's my understanding.

Again, there's several different -- you know, diffuse large B-cell lymphoma has several different subtypes and -- and, you know, in general, it would be diffuse large B-cell lymphoma NOS. But in general, yeah, that's correct; the diffuse large B-cell lymphoma, speaking in general terms, is a subtype of a non-Hodgkin's lymphoma.

BY MS. HORAN:

Q. Your third opinion is that "Chemicals found in the water in Camp Lejeune, including trichloroethylene (TCE), tetrachloroethylene (PCE), and benzene, are carcinogens and have been found to increase the risk for development of various non-Hodgkin lymphomas in both animals and humans, including diffuse large B-cell lymphoma." Did I read that correctly?

A. Yes.

Q. Is that opinion opinion on general causation?

A. Well, it's an opinion based on the specific cancer that Mr. Vidana has. But again, it applies -- I can't have a specific causation that Mr. Vidana's malignancy was caused by his exposure to a particular carcinogen without having the baseline

knowledge that that malignancy can at all be related to those exposures, those chemical exposures.

So you can't really have, by definition, a specific causation in any individual case without having an underlying general causation that that can happen.

Q. Sure. And your Opinion 3 is your opinion that, generally, these chemicals can cause diffuse large B-cell lymphoma; fair?

A. That's correct. Generally, they can.

Q. Are you offering an opinion on how much it increases the risk?

MS. GJONAJ: Object to form.

MS. HORAN: That's fair. Let me rephrase.

BY MS. HORAN:

Q. Are you offering an opinion on how much exposure to TCE, PCE, and benzene increases the risk of developing diffuse large B-cell lymphoma?

MS. GJONAJ: Object to form.

THE WITNESS: Not in the sense that Mr. Vidana -- in his case, it was -- he developed diffuse large B-cell lymphoma, so that's kind of a moot point about how much it increases risk for other people. I'm specifically talking about Mr. Vidana and

whether his exposure, in my opinion, was sufficient to be, at least as likely as not, a cause for his lymphoma, which, in my opinion, it is.

And again, that's based on my review of the epidemiology in conjunction with the mechanistic data. It's not something based on one particular number that was noted in a particular observational study or a particular duration.

BY MS. HORAN:

Q. Your fourth opinion -- let me turn to page 2 -- is that "Jose Vidana spent time at Camp Lejeune and, over the course of approximately six weeks was exposed to water contaminated with chemicals including TCE, PCE and benzene." Did I read that correctly?

A. Yes.

Q. You're not opining on DCE, correct?

A. Correct.

Q. And your fifth opinion is that "The contaminated water to which Mr. Vidana was exposed during his time in Camp Lejeune was as likely as not a cause of his non-Hodgkin lymphoma." Did I read that correctly?

A. That's correct.

Q. I believe you might have mentioned this earlier, but you were instructed to use the "at least as likely as not" standard?

MS. GJONAJ: Object to form.

THE WITNESS: I wasn't instructed to. I was told that that was the standard and whether it was my opinion that that applied to this case. But I wasn't instructed to use it.

BY MS. HORAN:

Q. What distinction are you drawing between my use of the word "instructed" and I believe your answer, which is that you were told to use it?

A. No, no, no. So I was told that that was the standard in this case; not being told to use it. If I had wanted to use it -- a different terminology, it would depend on what is going on in that particular litigation or that court or that circuit, whatever terminology they are using.

So I wasn't told "We need a report where you come to this opinion. We are instructing you to use this opinion." I was told that is the standard in this litigation, that -- and that "You come up to your own conclusions about whether you feel like the data and your evaluation of all of the studies and

the weight of the evidence have you form an opinion where you can be confident in using that terminology."

But that's the distinction I'm drawing. I wasn't instructed, "You need to use it," or told, "You need to use it." I was told, "Do your own evaluation. This is the standard that's being used in the court, and you come up with a report about whether you feel comfortable or if you have the opinion that you can say that, with a reasonable degree of medical certainty, in this particular case for Mr. Vidana."

Q. Sure. So I -- you were not instructed as to your conclusion, but you were instructed that "at least as likely as not" is the standard being used in this case?

A. Yes. I was instructed or told that that was the standard being used in this case, which I independently verified.

Q. You said you independently verified. What did you mean by that?

A. Well, when I was reading -- I believe when I started reading about this standard, that it was specifically said in the Camp Lejeune Act of 2022 or -- I don't remember what it was, but I saw that

wording used.

Q. Other than the Camp Lejeune Justice Acts, do you recall seeing the "at least as likely as not" standard elsewhere?

A. I just believe that I've seen that before with one of the DOJ's experts, Dr. Goodman. I believe she's used that prior to this litigation, actually. So I didn't think that it was something that was in dispute by the United States.

Q. Other than Dr. Goodman's study, where you think "at least as likely as not" was used, have you seen the "at least as likely as not" used in other peer-reviewed published studies?

A. Other than the defense's own expert, and in the -- the Congressional Act, I don't recall if I've specifically seen that. Because generally in the medical literature, you don't use that terminology; that's more of a legal term. Even "more likely than not," those are legal terms. So you don't tend to see those, generally speaking, in medical literature.

Q. Do you use "at least as likely as not" with patients?

A. Not in those exact words, but with respect to talking at tumor boards, or speaking with

clinicians, I would say probably, or likely. So -- but I -- again, that's a legal terminology that would not really fit into a pathology report, but we use "consistent with," "suggestive of."

Those are all -- and that's used daily. Those are all analogies to, you know, "most likely," "most consistent with," "most suggestive of," "suggestive of," you know, "diagnostic of," "most diagnostic of." We use a variety of terminologies that are analogous to the legal terms. We just use them in the setting of a -- medical diagnostic reports.

Q. The medical terms that you said you use daily, are you saying all of those are analogous to "at least as likely as not"? Or if not, then what are the medical terms that you would say are analogous to "at least as likely as not"?

A. I would say the most -- the closely associated would be "suggestive of," where maybe it's like a 50-50 in a differential diagnosis, would include, you know, two different things that seem 50-50, or could be more than that.

You know, "you favor" -- "a favor" -- "you favor one"; it's another terminology we use. "Favor this." "Favor that."

So I would say that there's a variety of terms that are used. I would say that "consistent with" would not be analogous to "at least as likely as not." "Consistent with" would be more analogous to "more likely than not." I would say it would be the most closely mirrored of the legal versus medical terminology.

It really depends on the context. All of this depends on the context.

Q. You've reviewed the Camp Lejeune Justice Act; fair?

A. Yes.

Q. Do you recall when you reviewed the Camp Lejeune Justice Act?

A. Before I was involved in this litigation, and then after -- again, after November of 2024, when I was, you know, asked to look at this case.

Q. And you're not interpreting legal language, correct?

A. I don't know what you mean by "interpreting legal language."

Q. So I think -- so I believe you said that you understood that "at least as likely as not" standard comes from the Act, correct?

A. Correct.

Q. Okay.

A. Well, that's one of the places I've seen it. I think we already established the Department of Justice expert, Dr. Goodman, has also used it, I believe.

Q. Sure. And you're not trying to interpret the "at least as likely as not" standard from a legal perspective, correct?

A. Well, just in the sense that I speak English, and I know how to interpret words. So I'm not -- it's not like it's in French, and I'm having someone translate it for me. It's English, and I was born in this country, and I know how to speak English. So I know what "as least as likely as not" means.

Q. Sure. And what we've been talking about, you've told me some analogous medical terms. You've taken this language and you've translated it to your profession of medicine; fair?

A. I haven't -- I would not say that I've translated it, because all of the terms that I used, I did not use in this -- my specific causation report.

But I am -- what -- I'm drawing the analogy to that, but again, it's not -- it's not a

perfect analogy, because I wouldn't say that the percentages would be exactly the same. And it would depend on how someone was using those medical terms or how someone is interpreting the medical terminology in the context of a particular -- the rest of the comment or the rest of a case.

It's -- it's much more convoluted and complicated and nuanced than just translating in the medical version "at least as likely as not" and a medical term that I would use. But what I'm telling you is that I -- I am confident that I understand what "at least as likely as not" a cause means, and that I'm comfortable expressing that opinion in this case, with Mr. Vidana and his exposure at Camp Lejeune, being at least as likely as not a cause for his non-Hodgkin lymphoma, in this case a large B-cell lymphoma.

Are you there?

Q. Yeah, I'm here.

A. Okay. I thought I was frozen. Sorry.

Q. No, sorry. Just looking down. I'm trying to make sure I'm streamlining it as much as I can.

Have you ever used the standard "at least as likely as not" in your own publications?

A. No. Again, as I mentioned, it's not

something that's typically used in most published medical literature, and it's not something that I have used before. I've also never used "more likely than not" or "a reasonable degree of medical certainty." Those aren't things that are generally included in published medical literature, and certainly not published medical literature with respect to the scientific articles that I published.

Q. We have been going about an hour and 15 minutes. Do you mind if we take just a quick break?

A. Well, can we take a little bit longer of a break, so I can get lunch? Or . . .

Q. Oh, absolutely.

MS. HORAN: Do you want -- let's go off the record, and we can figure out the -- the timing.

VIDEOGRAPHER: Going off the record at 1:15 p.m.

(A luncheon recess transpired from 1:15 p.m. until 2:01 p.m.)

VIDEOGRAPHER: Back on the record at 2:01 p.m.

BY MS. HORAN:

Q. I'm going to put back on the screen your

expert report, Dr. Michaels. And this is Exhibit 1, and I'm going to turn to page 5 and 6, which is -- and specifically Section VI.

Do you see that on the screen? It's the section entitled "Contaminants Found Within Camp Lejeune Water."

A. Yes.

Q. Okay. And you state: "In forming my opinions regarding Mr. Vidana's exposure to carcinogens while stationed at Camp Lejeune, I am relying on a report titled 'ATSDR Assessment of the Evidence for the Drinking Water Contaminants at Camp Lejeune and Specific Cancers and Other Diseases,' released on January 13, 2017. I have also been provided with the expert report and appendices of Morris L. Maslia, PE, and initially incorporated the values in that report in forming my opinion." Did I read that correctly?

A. Yes.

Q. Okay. The ATSDR report you referenced in this section, the 2017 assessment of the evidence, that's the same report that's -- we've talked about several times today and was marked as Exhibit 3, correct?

A. That's my understanding, correct.

Q. Other than the ATSDR report and Mr. Maslia's expert report, did you rely on any other sources in forming your opinion regarding Mr. Vidana's exposure to carcinogens while stationed at Camp Lejeune?

A. Well, we addressed this earlier with respect to my "Materials Considered" list. But, you know, I did review -- I didn't review Dr. Reynolds's final draft, because it was finalized after mine, with respect to what's listed on my "Materials Considered" list -- I shouldn't say "final draft"; I should say "final signed report."

But I did review a prior prefinal draft with respect to the water modeling and exposure that she looked at for Mr. Vidana.

Q. So you relied on a draft of Dr. Reynolds' report?

A. Right. It was her actual data, and it did not -- that aspect that I -- from what I was able to see, did not change with respect to the numbers that she calculated and her, you know, assessment of his exposure with respect to number of days over the course of that time period.

Q. So you're saying that Dr. Reynolds did not change the number of days from the draft you saw to

the final?

A. No, I'm just saying that I did not notice that there was any change from what I reviewed to the final report.

Q. Okay. And you don't cite to Dr. Reynolds in your expert report; fair?

A. I don't cite to it because I don't -- there wasn't a final report. I actually don't cite to any of the, you know, general causation reports or anything. But it was simply one aspect of what I looked at, but I included it in my "Materials Considered" list.

Q. Sure. But you don't have any analysis in your report where you analyzed Dr. Reynolds' conclusions to incorporate them into your final analysis?

MS. GJONAJ: Object to form.

THE WITNESS: Could you repeat that?

BY MS. HORAN:

Q. Sure. There's nowhere in your report that references Dr. Reynolds, or her conclusions; fair?

A. I don't reference her conclusions, because again, they were not finalized by the time of my report. But they -- there were aspects of her report that supported my opinions that were not otherwise

modified by either her final draft or the absence of them.

Q. Okay. You say they were -- there were parts of her report that supported your report? Is that what you said?

A. Well, no -- what I'm saying is her -- her evaluation of the levels that Mr. Vidana was exposed to was consistent with my understanding of his exposure level and the degree of his exposure.

Q. Okay. You don't have the levels or the numbers that Dr. Reynolds includes in her report anywhere in your report; fair?

MS. GJONAJ: Object to form.

THE WITNESS: No, that's not fair. And let me tell you -- let me tell you why.

BY MS. HORAN:

Q. Sure.

A. Because on page 6, where it -- I talk about the last sentence of that first paragraph, that -- you know, it's before Section VII. I say, "During the period of time when Mr. Vidana was at Camp Lejeune, the concentrations in finished water ranged from" -- and I include the -- the ranges. Those are all ranges that she also had in her tables that she listed in her report.

So as I was saying, they are -- what I reference in here is consistent with the tables that she has in her report.

Q. So you and Dr. Reynolds relied on the same data from Mr. Maslia's report?

A. That's my understanding.

Q. Okay. And what is your understanding of the opinions that Dr. Reynolds is offering in this case, outside of the data she's relying on?

MS. GJONAJ: Object to form.

THE WITNESS: Could you repeat that?

BY MS. HORAN:

Q. Sure. Is it -- what is your understanding of what opinions Dr. Reynolds was offering in her report that you saw after you completed your expert report?

MS. GJONAJ: Object to form.

THE WITNESS: No. So I -- again, I saw her -- her draft before I completed my expert report. By definition, her completed -- and maybe the -- the draft that I saw -- because it looked substantially similar; I didn't notice any differences. Maybe her signed report on February 7th, or whenever it was, was exactly the same as the version I saw.

I was simply evaluating her analysis of the exposure levels based on the time period Mr. Vidana was at Camp Lejeune, based on the amount of time he would have likely spent at Hadnot Point, based on his deposition testimony, the number of hours he would have been awake, his degree of consumption, et cetera.

So those are the -- I guess her opinions were based on what she chose for the number of days in a week that he would have had an exposure, and corresponding that to the total amount of micrograms that he would have been exposed to over the course of his time stationed there.

So those are the extent of the opinions that I can recall, as I sit here, that I evaluated with respect to her report.

BY MS. HORAN:

Q. Sure. So you evaluated Dr. Reynolds' opinions on his exposure level. But did you rely on them in forming your opinion?

A. Yes. I relied on her data that she had with respect to, you know, what she listed, and it substantiated my previously held interpretation of my opinions with respect to his deposition testimony,

with respect to number of days and the amount of consumption that he would have been considered to have, based on his level of exposure and his location.

Q. Dr. Reynolds' conclusions about exposure levels in terms of the micrograms that she determined for Mr. Vidana, those microgram totals don't appear anywhere in your report; fair?

MS. GJONAJ: Objection to form.

THE WITNESS: The totals, correct. The totals don't appear. Again, I reviewed her draft that -- during the time period that Mr. Vidana was at Camp Lejeune, I included the concentrations that would have been in May and June of '83 for the four volatile organic compounds that we're talking about, that I addressed in my report.

But as far as the total amount, it wasn't really something that was, in my opinion, based on all of the other factors, something that needed to be in my report, based on my analysis of the weight of the evidence of everything else.

BY MS. HORAN:

Q. You say the total amount didn't need to be

in your report, based on the evidence of everything else. What do you mean by that?

A. So what I mean by that is my opinions were -- would not have been swayed, knowing what the baseline level was in the water in May and June, that there was nothing else that I felt like, in combination with the type of malignancy he had, with the -- the temporality of his exposure, with the lack of any other associated causal risk factors in his case, with the known mechanistic data of what he would have been exposed to -- specifically the genotoxicity of the volatile organic compounds, the immune dysregulation that's known to occur in those -- in those contexts with those particular carcinogens, that immunosuppression, the depression of CD4 and CD8 B-cells and T-cells, the reactive oxygen species that are associated with those carcinogens, All of that, in combination, was strong enough and the weight of evidence was strong enough that I didn't feel the need to add an additional layer of an analysis that she performed to say that this number of total micrograms adds something to my opinion.

My opinion was already strong enough based on what it was. All I'm doing right now is

clarifying, for you and for the record, that I reviewed her draft. I did not review her final report. And the numbers that she uses to come up with her overall exposure data were comparable and consistent with the numbers that I used, which we both got from the same sources. That's all I'm saying.

Q. You say they were comparable to the numbers you used. What numbers are you referencing?

A. The last sentence that I just -- or the second-to-the-last sentence that I had just read.

Q. So you're referencing Mr. Maslia's numbers that you've included in your report?

A. Correct. And if we want to pull them up side by side to make this easier for you, we can go side by side and show her chart and the numbers that I'm listing in written form on page 6 of my report, if that makes it easier.

Q. No, I understand. I'm just understanding what pieces of her report you used and relied on and which ones you didn't feel the need to use and rely on.

And so you found the -- the number of days, which I believe you testified that -- earlier today, that your report said May 12th, and

Dr. Reynolds' or someone else's report said May 8th. And so that was a discrepancy that you found when you were reviewing your report. Is that fair?

MS. GJONAJ: I'm just going to object to the first part of -- I think before you asked the question, I think it misrepresented his prior testimony.

Go ahead.

THE WITNESS: Well, what I had said was that -- what I had said was that when I was reviewing her -- her chart, that she had said May 8th was the start, and I had said May 12th was the start. And I wasn't sure, based on -- I -- mine might have been a typographical error. I noticed that after the report was done, which is why I pointed it out.

BY MS. HORAN:

Q. Sure. Did you do anything to investigate whether May 8th or May 12th is the correct start date for Mr. Vidana's time at Camp Lejeune?

A. I don't remember -- I just recently noticed it, and I haven't had the chance to go back and try and get his original records to see what it was.

So I -- again, I -- I think it was a

typographical error, but I -- I can't say with 100 percent certainty as I sit here. Regardless, it doesn't change the substance of my opinions.

Q. And you and Dr. Reynolds both used Mr. Maslia's Hadnot Point numbers in determining the level of exposure that Mr. Vidana would have been exposed to when he went to Hadnot Point; fair?

A. That's correct.

Q. Other than the number of days and the level of exposure from Mr. Maslia's report, is there anything else, any other data inputs that both you and Dr. Reynolds relied on that you reviewed to ensure that you agreed with?

MS. GJONAJ: Object to form.

THE WITNESS: You know, I don't recall all the specifics of her report. So I would have to review her report in its entirety if you want me to answer that question.

BY MS. HORAN:

Q. Okay. And you did not feel the need to use the total microgram numbers that Dr. Reynolds concluded in her report? You didn't feel the need to include those in your report, correct?

A. Well, so -- you know, that's her specialty. Just like she didn't include any of the

details about diffuse large B-cell lymphoma and histologic subtypes in her report. So I knew that she had a report where she was addressing that.

The overall number in May and June of '83, of what was the actual concentration in the water at that time, was similar. But I was, again, relying on her report, but also found the data that she used to develop those calculations was the same -- from the same source of the data that I used.

Q. Okay. Did you use the total micrograms in forming your opinion that Mr. Vidana's non-Hodgkin's lymphoma was, at least as likely as not, caused by the water at Camp Lejeune?

MS. GJONAJ: Object to form.

THE WITNESS: I don't really know how to answer, did I use it? It's consistent with my opinion, but it's not really something that I used, in real time, to say whether or not my opinions were what they were.

Regardless of those calculations, my opinions would have been the same. Are those calculations consistent with my opinion? Yes. But I wouldn't say that I used them in any objective sense to push me over the edge in forming the opinion that, at least as likely as

not, his exposure was related to his diffuse large B-cell lymphoma.

BY MS. HORAN:

Q. Where -- where on Camp Lejeune, to the best of your understanding, did Mr. Vidana live?

A. I thought I already testified to that. It's Camp Johnson.

Q. And is it also your understanding that Mr. Vidana worked on Camp Johnson?

A. Well, I guess it depends on what you describe as "work." But my -- my impression is that Monday through Friday, he was predominantly at Camp Johnson. But he testified that in the evenings and on the weekends, that he traveled all over the base.

Q. And the numbers that you've included on page 6, that we -- it's in the second-to-last sentence. It reads: "During the period of time when Mr. Vidana was at Camp Lejeune, the concentrations in finished water ranged from 449 to 546 micrograms per liter for TCE, 22 to 27 micrograms per liter for PCE, 7 to 8 micrograms per liter for benzene, and 36 to 45 micrograms per liter for vinyl chloride." Did I read that correctly?

A. Yes.

Q. And those are numbers for contaminant

levels at Hadnot Point, correct?

A. Correct.

Q. How did you determine that Mr. Vidana was exposed to water at Hadnot Point?

A. From his deposition testimony. That was my -- you know, before I read his deposition testimony, I did some, you know, research, and asked questions with respect to the different aspects of the base. And there was a lot of detail in the ATSDR. And just looking into where Camp Johnson was in relationship to the other water supplies of Tarawa Terrace and Holcomb Boulevard and Hadnot Point, and, you know, reading about -- when I read about, in the deposition transcript, where they talked about -- he mentioned about Main -- Mainside, I think, and what that referred to, and he went to bars and restaurants, and where would those be.

And so it came from a lot of independent kind of research in asking the question, "Okay, what does this mean, and where would this have been?" And then looking into it in that respect. Because otherwise I would not have known the significance of just independently being told -- Hadnot Point versus Tarawa Terrace is not something that I would have known, so I had to do a lot of reading into -- you

know, a lot of that's spelled out in the ATSDR and in other kind of references that I was able to find that specifically talked about the different locations and the wells in Camp Lejeune.

Q. How did the locations of the wells factor into your opinion that Mr. Vidana went to Hadnot Point?

A. I didn't say that they did.

Q. Oh, okay.

You mentioned that you asked questions. Did you ask questions of individuals? Did you talk to anyone about this? Or what did you mean by that?

A. No, I meant like asking myself the question: What does this mean in his deposition transcript? And then investigating the answer.

It's like hypothesis and theory. Like, okay, I'm going to -- hypothesis is you're asking the question, you know, "Does this cause this?" That's what I mean, like ask the question in that respect.

Q. Understood.

A. Not an individual a question.

Q. Understood.

And you said you did research to answer those questions through the ATSDR? Is that fair?

A. That's -- like I said, that's one of the

references that I looked at. But I also reviewed other -- you know, there were also, in other publications, I think, mentions of -- you know, Hadnot Point was where the barracks were, and this was, and this was, and, you know, all the restaurants.

And they were -- over the course of reading everything, all of my references of things that are in my "Materials Considered," there's bits and pieces in all of -- in many of those, I should say -- that helped form my opinion about the actual daily life of a marine in the '70s and '80s in Camp Lejeune and what was really in the individual areas.

Q. Beyond generally -- and I'm happy to flip to your "Materials Considered" list if that would be helpful -- but is there any -- with any more specificity, can you point me to what publications you looked at to determine, you know, that Hadnot Point had restaurants, and a number of other things that you're -- you've just referenced?

A. I think most of them, as I said, were in the ATSDR. And, you know, just trying to Google about Camp Lejeune and different locations, that was my understanding, from my evaluation of what I could

find online and in the ATSDR regarding the different locations where -- Tarawa Terrace is more like families, and Hadnot Point had the vast majority of the restaurants, which people called Mainside, and they had bars and barracks, et cetera.

So that was -- that was my understanding from -- just from the course of -- of reviewing all of the literature in coming up with my report. But I can't -- but I've already -- I've already told you multiple times, majority, I think, was in the ATSDR. And then obviously the -- probably some of the Camp Lejeune-specific references, you know, might have mentioned something in bits and pieces, not anything with any additional significant detail that's not in the ATSDR.

Q. And the ATSDR, you're referring to the reports cited in your report and on the "Materials Considered" list?

A. Correct.

Q. Okay. You mentioned Mainside.

MS. HORAN: Is it -- I want to share my screen. Let me pull this into the chat for you, Diana.

I'm marking as Exhibit 5 -- this is Mr. Vidana's deposition transcript.

(Exhibit 5 was marked for identification.)
BY MS. HORAN:
Q. I believe you testified that Mr. Vidana referenced Mainside, and I just wanted to understand what testimony you were referring to. I'm going to turn to page -- do you see page 100?
Would it be helpful if I zoom in?
A. Yeah, I can't -- I don't -- can't see that. I'm not a crow. I can't see that small.
Q. It's also available in the chat, if -- if that would be easier for you.
A. Okay.
Q. Okay. Can you read on page 100, lines 3 through 17? I don't need you to read them out loud, just in your mind.
A. Okay. Yeah, I've read that.
Q. Okay. And so Mr. Vidana testified that he did not know what "Mainside" meant; fair?
MS. GJONAJ: Objection.
THE WITNESS: That's correct, but it was -- again, it was correlating with what -- he didn't know what it meant, and he even talks about later that, you know, many years ago, and what they may call things now is different than what they called things then.

And so he wasn't sure, but he went on to elaborate that he went to bars and restaurants and stuff, which would have correlated with what is today known -- I guess today, or for the purposes of this -- known as Mainside.

So yeah, if you want to just point out those 14 or 15 lines that -- yeah, you don't have the full context of, that when he went on to describe where he was going and what he was doing, that would correlate most likely with Hadnot Point, which my understanding is what's referred to as Mainside. That's the point.

BY MS. HORAN:

Q. Sure. And I'm trying to understand to what limit you relied on Mr. Vidana for that, and to what pieces your own analysis that you've taken things Mr. Vidana said and then formed an opinion.

So is it your understanding that Mr. Vidana testified that he went to Hadnot Point, or that Mr. Vidana testified to information that based on your questions and review that you did of the ATSDR and other sources, lead you to believe that Mr. Vidana went to Hadnot Point?

A. Yes. It's the latter. That -- based on what he -- because he even said he didn't like know

what these things meant and that it was 40 years ago, and, you know, he said that multiple times, that he wasn't sure.

But he described his day-to-day life during those seven weeks or whatever that he was there, and based on what he described, it's my opinion that during those times when he went to bars, and when he would have been, you know, going to restaurants, and, you know, in the car with, you know, other friends that he became friendly with; but those are the areas that, based on my understanding of the life of those individuals that spent time at Camp Lejeune, would have been at those times in what we know as Hadnot Point, as far as where the contaminated water would have been.

Q. You did not conclude that Mr. Vidana would have been exposed to water at Tarawa Terrace, correct?

A. No, I did not.

Q. And you did not conclude that Mr. Vidana would have been exposed to water at Holcomb Boulevard; fair?

A. That's correct. That's my understanding from his deposition testimony.

Q. What is your understanding of the

frequency with which Mr. Vidana would have been exposed to contaminated water at Camp Lejeune? Excuse me. Let me rephrase that.

What is your understanding of the frequency at which Mr. Vidana would have been exposed to contaminated water at Hadnot Point?

A. So I would say, based on his testimony, that it would have been between one and two days every week, corresponding to the weekends, at least, based on what he'd said and what he described.

Q. And how did you -- what facts did you rely on in coming to that conclusion?

A. His deposition testimony with respect to going to bars and eating in restaurants and when he would do that. And it certainly could have been more than that, but I think that that's probably a minimum, because, you know, he talked about it getting dark very quickly and getting cold very quickly, like around 8:00 o'clock.

So -- and based on, you know, the distance from Camp Johnson to Hadnot Point, it just seemed like it was a -- a likely frequency of one to two days a week over the course of that time that he was there.

Q. And for the days that he went to Hadnot

Point, do you have any assessment of how much water he would have been exposed to?

A. Well, I think it would depend. You know, he described some of -- like not knowing where he'd showered in different places, and would go to the sink and drink gallons of water. It wasn't clear whether some of those could have been Hadnot Point. The way he described running all over the base, it certainly could have been there.

So it's hard to say. I would say I would generally use, you know, the average that was used for the water modeling, which was, you know, by Maslia. I think it was like, you know, a little over at least a liter a day I thought sounded reasonable if that -- maybe that might have been an underestimate, given that's just only oral consumption, and not taking into account inhalation from showering, because he talked about being sweaty a lot and needing to shower a lot, and some of those, you know, sounds like they could have been at Hadnot Point or, you know, those areas.

Dermal exposure through showering would have been probably somewhat minimal in the grand scheme of his exposure. Eating -- it didn't sound like he went swimming anywhere in water that would

have been contaminated. So I would say it was at least a liter, kind of similar to the average -- I think they referred to it as CT, central tendency exposure, I think, level.

So anyway, so that was kind of how I came to that, based on water modeling that had been done. I believe that that was also referenced in Dr. Reynolds' report that I had reviewed, where she did a couple different ones; an RME level, which would have been like a maximum. And then for like, you know, an active Marine that was in Hadnot Point doing all of the training, et cetera.

And then the CTE, which would have been kind of just a general civilian average risk or average amount of water consumption which I would imagine, based on his testimony, he would have been closer to that, that CTE. So . . .

Q. So it's your assessment that he was exposed to about 1 liter per day for the one to two days per week that he was at Hadnot Point?

A. Probably a little more than that. And I think even the -- I do remember one of the defense experts even saying they felt like it was more than what Dr. Reynolds had written in her report, which I think -- we would have to pull up her report, but I

believe it was 1.2 liters per day was the estimate, the average estimate for the CTE. And I think they said that they would have even gone higher than that, just based on inhalation from showering.

And again, I think, based on his deposition testimony, it may have even been higher than that, just based on the fact of him testifying to drinking gallons of water, and maybe some of those areas could have been at Hadnot Point. And it wouldn't just have been at bars, when he was drinking water, fluid, et cetera.

Q. You referenced the gallons of water that he was drinking from. What is your basis that that could have been from Hadnot Point? Is it just the testimony of going to restaurants?

A. No. So he had said that he ran all over the base, and that they would shower in different areas. It didn't seem like it was -- based on his testimony, it didn't seem like it was always at the same area.

So -- and again, I'm not -- I'm not assuming that it was more than that; but I'm saying I can't exclude that he -- that's why I chose -- that's why I'm saying it's -- I'm going with what Dr. Reynolds evaluated as the CTE for him, and not

assuming that it's the higher level, although it could be, based on his lack of being able to pinpoint where he was showering and drinking outside the showers when they would switch.

Q. Okay. So you did also rely on Dr. Reynolds for determining the amount of water per day that Mr. Vidana would have been exposed to when he went to Hadnot Point?

MS. GJONAJ: Objection. Form.

THE WITNESS: Well, I think it was consistent with Maslia's report. I thought that those numbers were similar, which I found them to all be similar.

BY MS. HORAN:

Q. Okay. And for your opinion, what number did you rely on for the amount of water that Mr. Vidana would have been exposed to when he went to Hadnot Point?

MS. GJONAJ: Object to form.

THE WITNESS: Well, again, it would have been in that range. It wasn't -- I didn't come to a specific opinion that it's 1.5/8ths liters per day. I was coming to the opinion that it would be more in this range.

But again, it didn't -- that did not

affect the substance of my opinions, based on all of the weight of the evidence with the mechanistic studies that I've mentioned, the genotoxicity of those substances that were in the water, all of that taken into account, you know, would be much more important than the -- the fraction of a couple liters that we're talking about from 40 years ago.

BY MS. HORAN:

Q. I'm putting back on the screen -- let me know when you can see it, Dr. Michaels.

A. I can see it.

Q. Okay. Great.

I'm going to turn to page 13, which is I believe where you talk about the gallons and a couple things you just referenced in your testimony.

A. Okay.

Q. I believe it's under -- on page 13, for the record, in Section VIII, it says "Discussion Of Vidana Case Facts." Do you see that?

A. Yes.

Q. Okay. "According" -- and the -- the paragraph right below it. Do you see that piece?

A. Yes.

Q. Okay. The second sentence says, "During

his time at Camp Lejeune, Mr. Vidana testified that, following running, he would shower and" -- in quotations -- "'drink 5 gallons of water off the sink.' He noted that he 'couldn't drink enough water' while at Camp Lejeune. He also testified that he showered 'much more' than twice a day because he was criticized for perspiring so much, approximately 3 to 5 times per day on weekdays, and 2 to 3 times on weekends, sometimes for more than 15 to 20 minutes at a time." Did I read that correctly?

A. Yes.

Q. And are these the facts you used in assessing the amount of exposure that Mr. Vidana might have had to Hadnot Point water?

MS. GJONAJ: Object to form.

THE WITNESS: Well, again, this is -- as I've already testified to, you know, not all of this would have occurred at Hadnot Point; much of this would have likely been at Camp Johnson.

And so -- but that's what I've been testifying to today, is the distinction about, you know, how much of that would have been likely at Hadnot Point, which I've already mentioned that that's one of the, you know, the -- one to two days on the -- per week would

be my assessment of how much of that, that I elaborate on the first paragraph in Section VIII, would have actually been at Hadnot Point.

BY MS. HORAN:

Q. Sorry. You said you elaborate in the first paragraph that -- of Section VIII on how much of this would have been at Hadnot Point? Is that -- did I understand that correctly?

A. Yeah. Do you want to have the court reporter read -- repeat my answer, if you missed it?

Q. Sure.

MS. HORAN: Karen, would you mind?

(Whereupon the Court Reporter read the previous answer.)

BY MS. HORAN:

Q. Okay. You mentioned that you looked at Mr. Vidana's deposition testimony, Mr. Maslia's report, and Dr. Reynolds', to determine the amount of water he would have been exposed to on those one to two days per week that he was at Hadnot Point. Did you use any other sources?

A. Not that I can think of.

Q. Did you do any assessment to determine where the dining hall that Mr. Vidana would have used

was?

A. Well, my understanding was that the dining hall that he used during the week was at Camp Johnson, and that on the weekends is when he would go to restaurants and bars, which I took as a distinction from the dining hall. And most of those, from my understanding and interpretation of what I read, were at Hadnot Point.

Q. Turning back to Exhibit 1, page 13, the second sentence, where you say that after running, "he would shower and 'drink 5 gallons of water off the sink.'" The shower and the 5 gallons of water that he would drink off of the sink, those were both at Camp Johnson, correct?

A. You know, it's not necessarily were always there. It wasn't clear. I think most of it was likely at Camp Johnson. But again, his uncertainty in being -- in describing running all over the base and showering in different facilities, it could have been -- some of that could have been at Hadnot Point, from my understanding of his deposition transcript.

Q. I'm putting on the screen Exhibit 5, which is Mr. Vidana's deposition testimony. And I want to make sure you can read this, so I'm going to ask you to read -- you don't have to read it out loud, but

pages 114 and 115. And I'll just scroll whenever you're -- you're ready.

A. Okay.

Okay. Okay, okay.

Q. So the testimony to drinking 5 gallons from the sink, that took place in his barracks. Correct?

A. Well, where's the part about him showering on the weekends?

Q. So I can turn to -- well, so -- well, let's -- let's turn to showering next. Let's just do the drinking the 5 gallons off the sink.

A. No, no, that's not how it's going to work.

So -- and for me, that -- he is -- this is one part of the context of his deposition. So he's talking about -- here about showering, but it's talking about showering Monday through Friday. From my recollection, in his deposition testimony, he talked about showering two to three times on the weekends. And so I want to see where he talks about the weekends, about it, because I didn't just make that up. I got that from somewhere in his deposition testimony.

So before I evaluate what he comments here, I can't take one piece of his deposition

testimony and answer a broad question like that. So I would be more comfortable, since I'm the only one here that's under oath, to make sure my opinions are accurate, looking at what I actually interpreted when I read the entire deposition transcript and put in Section VIII what you've already read.

Q. Sure. So if you turn to page 120. You can read, obviously, as much as you'd like, and I'm happy -- you can read all the testimony in between the two, if you'd like.

A. Yeah. Can you go to page 119 first, please?

Q. Sure.

MS. GJONAJ: Dr. Michaels, I think it's the last -- she put it in the chat as well. So if you'd prefer --

THE WITNESS: Okay. Yeah, let me just -- let me go to the chat. I'm more comfortable with that than having you . . .

BY MS. HORAN:

Q. Yeah, absolutely. Dr. Michaels --

A. Yeah.

Q. -- time, I'm happy to -- happy to have you scroll as you would like.

A. Sure. Thanks. Let me just go to this,

really quickly.

Okay.

Q. Okay. So I guess, now that you've had a chance to review, what testimony were you referring to when you mentioned that the showering on the weekend may have happened at Hadnot Point?

A. Well, again, it's -- he talks about running all over the base and showering. So it wasn't clear to me, based on my understanding, whether all the showering occurred at the same location.

Q. Could you point me to where you're referencing?

A. Well, let me find it.

So on page 101, so line 6, it says, "Where else did you spend time?"

He said, "Again, it was 40 years ago. I couldn't tell you exactly where it was. But I can certainly tell that I've met some great Marines from the unit from school, and we were all over the place when we were not in the dining facility or if we were not out running on our own. We were out exploring. I have no idea where it was. I just wanted to get away from the barracks."

So that, in combination with talking about

perspiring a lot, and, you know, right there, you know, running on their own, if he was running on his own, was away from that. It's not clear to me that it was -- all the showering occurred necessarily in one place, since there were shower facilities at Hadnot Point.

And it wasn't clear to him, and it wasn't clear, based on his testimony, my understanding of the testimony, where exactly this occurred, if they occurred at the same place every single time.

But again, again, to emphasize, this is why I am using, for my assessment of his water consumption, a more conservative level; but yet qualifying that by saying if he happened to, you know, be showering at other locations, it could have been more.

And that's why I am using the assumption that it's on the lesser end. But based on his uncertainty, I'm adding the level of the certainty, saying that if it was what he -- it's possible, based on his unsure testimony of location, that it could have been more; but even with that minimum exposure level, assuming he never showered at Hadnot Point, my opinion would be the same, and then amount of water he was consuming would be the same as what I've

already testified to, approximately 1.2 liters, or whatever that's listed as, you know, Maslia's report and corroborated, essentially, by Dr. Reynolds, and, you know, also approximately by the defense expert who said that it probably was a little more than that, than what Dr. Reynolds had -- had said, based on inhalation.

Q. The 5 gallons that you referenced in your report, you agree that Mr. Vidana's testimony was that when he was talking about drinking 5 gallons from the sink, he was talking about drinking in his barracks, correct?

A. Can you repeat -- remind me what that was on?

Q. Sure. Pages 114 to page 115. I can flip to there.

A. Yeah, so -- so that was in -- in conversation about Monday through Friday. But which would -- he would be at his barracks, likely at Camp Johnson.

But again, those same details were not asked specifically when talking about the weekend. So the absence of it, again -- and again, to emphasize, that's why I'm using the, you know, CTE number, the central tendency exposure level, and not

using the higher number, which was approximately 6 liters, I believe, a day.

All I'm qualifying is saying based on the level of uncertainty in the deposition transcript, that it could have been more, because it's not like the questioner in his deposition said, "How much water would you -- would you drink any water from the sinks when you were showering on the weekend if you were not in your typical location?"

It's not clear, based on the testimony. That's all I'm testifying to now, is that my opinion with respect to the minimum amount of water that he would have consumed does not change; and all I'm saying is that it could have been more than that, but that's not a number that I'm relying on. I'm simply trying to testify accurately with respect to how he was deposed and the specific questions that he answered.

Q. Understood.

Have you ever spoken with Mr. Vidana to get any clarity on anything you were unclear about?

A. I have not.

Q. We've been going about an hour, and I think I might be able to streamline this a bit. Would -- would it be okay if we took a -- a 5- to

10-minute break?

A. Sure.

VIDEOGRAPHER: We're going to go off the record at 2:59 p.m.

(A recess transpired from 2:59 p.m. until 3:09 p.m.)

VIDEOGRAPHER: We're back on the record at 3:09 p.m.

BY MS. HORAN:

Q. Dr. Michaels, I have on the screen your report. Turn to page 5.

In the middle of the page, right before Section VI, you talk about causes of diffuse large B-cell lymphoma, which you also refer kind of -- throughout the report as "DLBCL." Is that fair?

A. Yes.

Q. And one of those studies you rely on is the Cerhan study?

A. Okay.

Q. It's footnote 6 and 7. Do you see that?

A. Okay. Yes.

MS. HORAN: I'm marking as Exhibit 6 -- this is the Cerhan study that you relied on in your report.

(Exhibit 6 was marked for identification.)

BY MS. HORAN:

Q. Correct?

MS. GJONAJ: It's also in the chat, if you need to look at it there.

THE WITNESS: Oh, yeah -- yes, I -- yes, I believe so. That's correct.

BY MS. HORAN:

Q. And for the record, this title -- this study is entitled "Medical History, Lifestyle, Family History, and Occupational Risk Factors for Diffuse Large B-cell Lymphoma: The InterLymph Non-Hodgkin Lymphoma Subtypes Project."

A. Yes.

Q. I'm going to zoom in so we can all read it a little easier.

I'm going to read the first section -- or first sentence of the results, but I'm not going to read all of the parentheses, which includes the odds ratios and the confidence intervals.

A. Okay.

Q. But the sentence reads: "DLBCL was associated with B-cell activating autoimmune diseases, hepatitis C virus seropositivity, family history of non-Hodgkin lymphoma, higher young adult body mass index, higher recreational sun exposure,

any atopic disorder, and higher socioeconomic status." Do you see that sentence?

A. Yes.

Q. Okay. And I'm happy to flip back to your report if it would be helpful. But I do not believe you included in your report the risk factor of higher young adult body mass index. Why did you not include that in your report?

A. Well, because, you know, according to the WHO obesity and non-Hodgkin's lymphoma, that data is inconsistent, which is their terminology that they use, I believe, in Volume 16, where weighting -- evaluating obesity as a carcinogen in the context of non-Hodgkin's lymphoma.

So -- and what I was focusing on is not overall risk factors; what I was focusing on are known causal risk factors. I think a lot of people would look at obesity, which, you know, the association with risk in many malignancies with obesity is somewhat well-defined in the setting of hormonal responses.

So, for example, obesity is a causal risk factor with breast cancer, endometrial cancer, other hormone-related malignancies in the sense that the adipocytes, which are what makes up the fat, have an

ability to peripherally convert circulating steroids into hormonally active products like estrone. Those can then promote a malignancy in the setting of a hormone-dependent neoplasia.

We know that mechanism in the setting of obesity. In the setting of nonhormone-associated malignancies with obesity as a risk factor, the reason a lot of the data is felt to be inconsistent is that it has a -- a somewhat nebulous mechanism that is not really well defined, and it's also inconsistent.

Now, as I mentioned earlier, sometimes you don't have to have the exact mechanism to know that a particular carcinogen leads to a particular disease. Before we understood the details of how cigarette smoke led to lung cancer, we still knew that cigarette smoke led to lung cancer, even before we understood how.

So I'm not implying by any means that because we don't understand how obesity may be a risk factor for some nonhormonal-related diseases, that it's not. But in that context, plus the added context of the fact that it's inconsistent, the epidemiology, and the fact that like this report talks about young adult body mass; others talk about

older adult body mass; others say that it's one versus the other; the others say that it's the other versus the other. It's -- it's all over the map, as the WHO, in the context of IARC, kind of elaborated on Volume 16 of their monograph.

So that's why I didn't list anything else with respect to higher socioeconomic status. I didn't really know his socioeconomic status. Those are all things that are more likely, you know, risk factors in the setting of confounding than necessarily a causal risk factor like a genotoxic mutagenic volatile organic compound like TCE, PCE, and benzene.

So that's what I really tried to focus on. And, you know, not address -- although I -- I acknowledged that he did have a history of obesity. I believe he was technically obese at the time of his diagnosis. I don't know what his body mass index was when he was a young adult, because that certainly doesn't qualify in his 40s.

Q. So you're relying on the WHO, Volume 16, to rule out -- strike that.

You relied on WHO, Volume 16, when you were assessing whether to include obesity as a -- as a factor?

A. No. So --

MS. GJONAJ: Object to form.

THE WITNESS: Yeah.

So it's not the WHO; it's -- it's IARC, which is part of the WHO, the World Health Organization. And they have a monograph that describes -- you know, the way they do it for -- they go through every single malignancy. And they talk specifically about obesity and non-Hodgkin's lymphoma, where they draw the conclusion that the data is inconsistent.

And so I'm not -- that doesn't play into account in my specific causation analysis, because I -- it's not a causal risk factor, as far as we've been able to delineate, whereas exposure to carcinogens is a causal risk factor. There's no risk of any sort of confounding element -- like a lot of times, with respect to obesity, which I've done a lot of independent research on in the setting of malignancies, with respect to obesity, a lot of what they have come to the conclusion is, is there's not really a -- a specific biomechanism, necessarily, that we know is at play with obesity and associated malignancies, but it more be -- it more is the

fact that -- well, if you're obese, then you also might have some insulin resistance, and it's what's associated with insulin resistance and the growth factors with insulin resistance that would relate to any sort of neoplasia or carcinogenesis, or the fact that if you're obese, you're more likely than others to be eating processed foods, or foods that are high in saturated fats, and some of those chemicals that are in the processed foods or the high-saturated fats would be more likely in a -- as a confounding, to lead to whatever associated malignancy may be in the literature.

But again, the IARC specifically concludes with respect to non-Hodgkin's lymphoma that it's an inconsistent finding. So -- and my understanding of the weight of the evidence and my opinion of the weight of the evidence for non-Hodgkin's lymphoma, including diffuse large B-cell lymphoma, with respect to the carcinogens and the chemicals that I describe in my report -- mainly benzene, TCE, and PCE -- is that it's not inconsistent. They've actually found that it is consistent; that there's sufficient evidence -- which is actually, I

believe, the terminology that they use -- is that there's sufficient evidence to say that non-Hodgkin lymphoma is related to those.

BY MS. HORAN:

Q. And the "they" you used in the last sentence was IARC? Who were you referencing when you said "they"?

A. I believe it was -- I believe that it's either IARC and -- and -- IARC and/or ATSDR. I'll have to look and see. I remember specifically seeing every malignancy separated -- I've reviewed so many references, but I've seen every single malignancy or group of malignancies separated out, where they went through -- it must have been ATSDR -- where they specifically said that it was sufficient for causation for TCE and benzene, and suggestive of an association or something -- some terminology like that, for PCE.

I would have to go through my references to find it, which I -- I could do, if you want me to take that time to do it, to give you the exact reference. But I know that that's what it said. And that's also corroborated by findings in IARC.

Q. And then in terms of obesity, you're saying the level of proof of causation is -- is

mixed, and there's not consistency across the studies to show that it's a risk factor for NHL. Am I understanding you correctly?

MS. GJONAJ: Objection.

THE WITNESS: You're understanding me and IARC. The research is --

BY MS. HORAN:

Q. Okay.

A. -- the WHO. So yes, that's correct. That's -- that's specifically what they are saying.

And as I elaborate, I've relied on the World Health Organization and their publications as one of the organizations that I rely on in forming my opinions. And that opinion matches my understanding from the literature which, before this litigation, I -- have been something that I -- is something that I have been interested in, and have actually lectured on, with respect to obesity and obesity-associated diseases.

Q. Okay. And you mentioned the WHO, Volume 16, is one of the places that you would have gotten that from?

A. It's -- it's IARC. And if you were to look up IARC obesity, you know, monograph, Volume 16, you would find it, I'm sure. That's what I remember.

Again, it wasn't something that -- my opinion is -- again, I didn't go through every single possible risk factor that has ever been listed in the literature for diffuse large B-cell lymphoma and say, "Well, this one is inconsistent; this one is inconsistent."

I went through the ones that are well-established known causal risk factors, and systematically said he didn't have evidence of an infection. He didn't have evidence of an autoimmune disease. He didn't have a -- a known inherited immunodeficiency. He didn't have an organ transplant.

I went through those in detail and ruled out ones that were actual causal risk factors.

Q. I'm marking as Exhibit 7 -- I just put it in the chat, Dr. Michaels, if that's easier for you; but I'll also put it on the screen.

MS. HORAN: I'm marking as Exhibit 7 -- this is a study by Marshall A. Lichtman, titled "Obesity and the Risk for a Hematological Malignancy: Leukemia, Lymphoma, or Myeloma."

(Exhibit 7 was marked for identification.)

BY MS. HORAN:

Q. Do you see that on your screen?

A. Yes.
Q. Are you familiar with this study?
I can zoom in.
A. I don't know if I've seen it before. This was in 2010, so 15 years ago; is that correct?
Q. It is 2025, and it looks like it was received and accepted and published in 2010; that's correct.
A. Okay. Yes, I -- I see this 15-year-old study.
Q. Does the fact that it's 15 years old factor into your analysis of this study in some particular manner?
A. 100 percent. And let me tell you why.
So this is a review. This isn't a study, as best as I can tell. There's no materials or methods. There's no results. This is a review of the available literature from 15 years ago, that would have been even before that, because it probably took him several months to write it.
So when you're talking about risk factors and causal risk factors, knowing the details of molecular biology and evidence, that's something that you need to review on an active, ongoing basis, because the biology and our understanding of the

biology changes so frequently.

So this is something that I would certainly -- I would not disregard on the face, but it's one person's opinion. This is a review article.

So that, in the grand scheme of what I would, you know, postulate on, would depend on what Marshall Lichtman references. So there may be very good articles as reference, but, you know, when you're comparing what -- the WHO subset of the International Agency for Research on Cancer, and someone that is a professor at the University of Rochester in New York, like -- if you're weighing the evidence or the -- the weight of the opinion, I think most people would generally go with the World Health Organization consensus piece, where they reviewed all of the literature and continually review all of the literature.

But I'm happy to discuss whatever his opinions are in this review article.

Q. So the first column under the "Abstract," do you see the sentence that begins "A significant association"? It's four lines up from the bottom.

A. Yes.

Q. Okay. It reads: "A significant association between the risk for non-Hodgkin's

lymphoma and elevated BMI was supported by a meta-analysis of 13 cohort and 9 case-control studies. The risk for diffuse large B-cell lymphoma may be especially significant." Did I read that correctly?

A. Yes, you read that correctly.

Q. You used a differential etiology or differential diagnosis methodology to answer the question of whether Mr. Vidana's exposure was at least as likely as not a cause of Mr. Vidana's diffuse large B-cell lymphoma. Is that fair?

A. Yes.

Q. And at a high level, could you -- or whatever level of detail you think you need; I'm not trying to limit you in any way -- describe the methodology of differential diagnosis that you used in this case?

MS. GJONAJ: Oh, I think we might have lost Dr. Michaels.

THE WITNESS: Can you hear me?

MS. HORAN: Yeah, yeah, you're back.

MS. GJONAJ: It froze on my end for a second. Could you just -- is there a -- could you repeat the question?

MS. HORAN: Sure.

BY MS. HORAN:

Q. If you could describe what methodology or differential etiology you applied in this case.

A. Okay. So it's what I do in my normal practice when I'm evaluating a case, which is evaluate, you know, a diagnosis or a potential diagnosis. In this case it's -- it's slightly different, where I'm evaluating the risk factors or the causation of a known diagnosis.

But it would apply to what I do in my normal practice when I do a clinical pathologic correlation, in the sense that, you know, someone comes in with a -- a particular type of symptom or a finding on a CAT scan, and I then try to correlate what could be the causes of that particular clinical finding, and can I correlate that with the histology.

So in the case of like a lung mass or a lung tumor, if I just see normal lung parenchyma with a little bit of inflammation, that doesn't necessarily correlate, but I have a differential of -- this could be something inflammatory; it could be something infectious; it could be something neoplastic; it could be a foreign body; it could be an autoimmune type of disease. And so you run through this differential, where you go through and

you eliminate possible etiologies for this lung mass.

Now, in this case, what I'm doing -- which is what I also do pathologically -- is I'm looking at a particular disease and trying to rule out or rule in causes, known causes, of that particular disease.

So I do this very frequently in the head and neck, when you're dealing with oropharyngeal and oral malignancies in particular, squamous cell carcinoma, where just making the diagnosis of invasive squamous cell carcinoma is not enough; I need to say what caused it. Is this HPV-associated? Is it associated with P53 mutation? Et cetera.

And so I then go through other steps, where I review the clinical history and review any sort of prior biopsies that had been done that may have predisposed the patient to developing that squamous cell carcinoma -- in the tongue, for instance -- and then, to the limit that I can, do additional studies to rule out or rule in the etiologies for that malignancy.

In this case, I can't really do any studies, and I can't review any other material to see if there were areas -- doesn't really apply in this case, because this was a nodal lymphoma in the sense if this had been in the -- let's say in the -- in the

bone, then I would look at other aspects of the bone to see if there was underlying chronic osteomyelitis, or maybe he was in battle and had shrapnel there and his chronic foreign body response led to it; but what I'm doing is reviewing what the known, established causation risk factors are for a non-Hodgkin's lymphoma -- in particular, diffuse large B-cell lymphoma -- and seeing if I can then rule out those, based on either his presentation, the location of the diagnostic material, or his clinical history.

And so that's basically what I did, utilizing his treating oncologist's testimony about testing she had done to do the same thing, with respect to making sure it's not HIV-associated; it's not EBV-associated; he wouldn't have any features that suggested it could be a hereditary mutation that would have predisposed to him having a diffuse large B-cell lymphoma, which then would have further prompted additional testing to make sure he doesn't develop one of the other malignancies that those germline mutations tend to predispose you to.

So it's that kind of very detailed long process that I do in my normal practice, that I did here, with this particular case.

Q. And I take it you did not consider

Mr. Vidana's weight, because you don't believe that obesity could be a risk factor for non-Hodgkin's lymphoma, so that would not have played into your differential diagnosis here? Is that fair?

MS. GJONAJ: Objection. Form.

THE WITNESS: Not -- that's not fair. No, I -- I did list his obesity. But again, it's my opinion that his obesity, based on the weight of the evidence, is not enough to support that it -- that another cause was at play in the development of his malignancy.

Again, because TCE, benzene, PCE, have very known biological plausibility with respect to genotoxicity, immune dysregulation, reactive oxygen, oxygen species and their effects on the DNA, immune suppression.

And in fact, in that -- with respect to obesity, which you just mentioned, if you wanted to talk about that review article from 2010, I believe that author specifically talked about biological plausibility, saying that it was not present for obesity like it is present for these carcinogens which is what I was testifying to earlier, that there really isn't a well-known biological plausibility for lymphomas.

BY MS. HORAN:

Q. Okay. So you did consider his obesity in your differential diagnosis?

A. I considered every aspect of his clinical history, including his other -- you know, there were other aspects of his clinical history; you know, sinus infections. Yeah, this was a head and neck malignancy. So can certain infections give rise to a subsequent lymphoma? Absolutely.

So I listed his sinus infection, but in my opinion, a sinus infection, or presenting with sinus infection, has no known -- like well-described associated risk with diffuse large B-cell lymphoma. But I didn't go in and present all of the data about sinus infections and subsequent malignancies because it's known that chronic inflammation can eventually lead to a malignancy.

But that's not generally seen with sinus infections, but I'm sure we could find articles that talks about -- and we do know there's a subcategory in the WHO for diffuse large B-cell associated with chronic inflammation.

And so there were lots of things -- he had a history of hypertension. You know, sinus infections. You know, prior eye surgery. He smoked

five cigarettes, I think, or something like that, a day since he was in his mid 20s, I believe.

So there were all these other things that I did not specifically go through and say, "Well, smoking is generally not considered" -- although some -- I'm sure you can find some reports where smoking is associated with a non-Hodgkin's lymphoma. But smoking five cigarettes a day would not, in my opinion, be sufficient to be a cause for a lymphoma especially when we don't generally consider, as the weight of the evidence, the overall body of the literature, that smoking is associated with non-Hodgkin's lymphoma.

So again, there's all these things that you do as a physician in the setting of doing a differential diagnosis or a differential etiology in this case, that you don't spell out everything as I'm doing it.

So that's all I'm saying, is that just because -- like I clearly -- if I had not listed that he was obese, and you said, "Dr. Michaels, did you know that he was obese," and I would say, "Well, no, I didn't."

So -- "Well, did you consider his obesity?" Well, I couldn't have considered it if I

didn't know about it. But at the same time, it may not have influenced my decision. But I wouldn't be able to testify to that if I didn't know about that going in.

Here I'm documenting that I know that he's obese, and I still come to my same conclusions and opinions that his exposure to TCE, benzene, and PCE were at least as likely as not a cause of his diffuse large B-cell lymphoma.

Again, I'm not saying they are the only cause, or that they are the primary cause; but they are, at least as likely as not, a cause. And in my opinion, based on the lack of biological plausibility data for obesity, that would not be anything that would sway me away from my original opinion that I come to, both within the body of my report and in the summary of my opinions.

Q. So you're not offering the opinion that Mr. Vidana's exposure to water at Camp Lejeune and the TCE, PCE, and benzene were the primary cause of Mr. Vidana's non-Hodgkin's lymphoma?

MS. GJONAJ: Objection to form.

THE WITNESS: Well, I was not asked to evaluate that. Again, I'm going based on the legal standard that I said that I reviewed in

conjunction with initially working on this, which was at least as likely as not.

And so I evaluated the literature and everything in that context. I did not evaluate the literature, in this specific causation case, for anything other than that.

BY MS. HORAN:

Q. I want to turn back to your report, page 14. Let me know when you can see it.

A. Okay.

Q. I think this is just the -- the text of what -- what we just talked about. But the sentence -- you see it begins "In coming to my conclusions"?

A. Yes.

Q. Okay. And that sentence reads: "In coming to my conclusions in this report, I used a differential etiology process applied to the question whether his exposure to the chemicals in the water at Camp Lejeune is 'as likely as not' a cause of Mr. Vidana's DLBCL." Did I read that sentence correctly?

A. No.

Q. What did I get wrong?

A. You missed "at least." You just said "as

likely as not."

Q. Oh. That's an important correction. Let me -- let me fix that and read it again, and we'll make sure I get it right this time.

"In coming to my conclusions in this report, I used a differential etiology process applied to the question whether his exposure to the chemicals in the water at Camp Lejeune is 'at least as likely as not' a cause of Mr. Vidana's DLBRL." Did I read that correctly this time?

A. Yes.

Q. Thank you, Dr. Michaels.

So your opinion is, you say, "a cause" of Mr. Vidana's DLBCL, as opposed to saying it's "the cause" or "the primary cause." Is that the distinction that we were just discussing?

A. Yes.

Q. Okay. I'm on page 5 of your report. The second full paragraph begins: "Although the etiology of diffuse large B-cell lymphoma (DLBCL)-NOS is unknown in the majority of cases" -- do you see that?

A. Yes.

Q. Okay. How do you factor in the majority of cases of DLBCL have an unknown cause, when doing a differential diagnosis, to come to an individual's

determination of -- of what could have caused their NHL?

A. Well, so that's based on, you know, I guess a synonymous term would be "idiopathic." And by definition, some things -- it's idiopathic does not -- is not associated with unknown cause.

So now the majority, I think this is -- you know, basically this is stated by the WHO, Classification of Hematopoietic Tumors, the most recent one in 2000- -- yeah, as of now 2025, the Fifth Edition, but it came out I believe a year or two ago -- that's based on, in general, evaluation of a patient's clinical history.

Because, you know, we have to acknowledge and accept that we're dealing with a -- a circumstance where we have known documentation of carcinogens that are at a very high objective level in water that was consumed by individuals where we know they were living for various periods of time.

And so when you have something like that, data like that, it by definition is no longer idiopathic, when you can establish -- or it's your opinion that those chemicals, in and of themselves, can lead to the disease that a person has come down with.

So although in the vast majority -- or I wouldn't say "vast majority"; but in the majority of cases of an NOS, not otherwise specified diffuse large B-cell lymphoma, that you're dealing with in a clinical setting, where you don't have clinicians that have dug deep into the prior exposure history; they didn't go to their house and test their well, all these patients that are living off the grid, or they haven't asked them specifically about every single environmental exposure or occupational exposure that they had in the last 30 years.

They're just going based on what they have at the time. They would have no other way of knowing, until you do that deeper dive, which sometimes is available, depending on the clinician, or depending on the circumstance in the medical records, and the occupational history that's available, you're really limited on when you can call something unknown.

For example, when I was going through medical school, it was well known that there was this Rule of Tens with a type of tumor called a pheochromocytoma. 10 percent are bilateral; 10 percent are in children; 10 percent are malignant; and 10 percent were known to be familial. But --

that was back in the '90s.

But now, as we have -- as time has progressed and molecular biology has progressed, that's no longer applicable. This Rule of Tens is no longer applicable, because it's now known that that -- what we thought was 10 percent of times that it was inherited, it's actually closer to 50 percent of times.

Nothing changed with that tumor. Our understanding has changed. As you have more information, as you have more of an understanding of the literature, as time goes on, the number of unknown or idiopathic cases of anything is decreasing.

We used to think that hereditary tumors in the breast were just related to the BRCA1 and 2. We only knew that that was the only -- that was 20 years ago -- that was the only known genetic mutation that predisposed you to breast cancer. Now there's over a dozen that are tested for, because our understanding has advanced.

So the number of cases that are not hereditary has actually gone down. And that's what we see occurring in any of these tumors, including non-Hodgkin's lymphoma, including diffuse large

B-cell lymphoma. The prior couple classifications of the World Health Organization hardly had any subtypes of diffuse large B-cell lymphoma.

In fact, in 2007, when this was diagnosed, it was just called large B-cell lymphoma and now we know there are like a dozen of subtypes of diffuse large B-cell lymphoma. Many of them are specifically categorized, based on the underlying etiology. That was not something that we knew 20 years ago.

So this is definitely something that's an evolving field, and it's evolving as we learn more information. And one thing that we continue to learn more information about is the mechanistic data for how these carcinogens are actually causing the mutations that lead to the malignancies including diffuse large B-cell lymphoma, which is so dominated by the underlying molecular alterations in BCL2, BCL6 gene rearrangements, et cetera.

Q. Turning back to page 14 of your report, the second full paragraph, that begins "In coming" -- do you see that?

A. The third full paragraph?

Q. Sure. Sorry, I thought the first paragraph went on to page 13. But the paragraph that begins "In coming." Do you see that?

A. Sorry, sorry, you said page -- which page?
Q. 14.
A. Oh, I'm sorry. I was on -- I was on another page.
Q. Oh.
A. Yes, yes, I see.
Q. Okay. That paragraph has a sentence that begins "Here, as discussed above" -- do you see that?
A. I see "In coming to my conclusions." That sentence?
Q. Yes. So that paragraph, five rows down, in the middle, it begins with "Here"?
A. Yes.
Q. Okay. That sentence reads: "Here, as discussed above, Mr. Vidana has only one generally accepted risk factor for NHL -- exposure to water at Camp Lejeune for sufficient time and at sufficient concentrations to be a cause of his NHL. We know that Mr. Vidana was exposed to the water at Camp Lejeune for more than 30 days and based on his testimony, that was an exposure consistent with the ATSDR report and the congressional 30-day time frame." Did I read that correctly?
A. Yes.
Q. You reference "sufficient time." Is that

the 30 days that has come up a couple of times today? Or what is your opinion or what did you mean when you put "sufficient time"?

A. Yeah, and that's -- again, just to clarify, the 30-days is, you know, over the course of -- you know, it's -- it's not that -- you know, none of the -- the data has been done that when you have a 30-day time period, or a two-month period, that every single day of that period is a time when you're being exposed, because there's always going to be -- in any of these epidemiologic studies, when they look at a period of time, you can never say how much during that period of time someone was exposed to. And so the 30-days doesn't mean on every single one of those 30 days he was being exposed to water with carcinogens. He was there for a period of greater than 30 days.

So that's what I'm referencing, and that's what my understanding of the referencing for the -- the limit of 30 days is with respect to, you know, Bove and -- et cetera, Rosenfeld, when they talk about 30 days. It's not the 30 consecutive days of being exposed on every day. It's that he was there for a period greater than 30 days.

Q. And I believe you testified that you

believe he was exposed one to two days per week, based on his testimony. Correct?

A. That's correct.

Q. So he wasn't exposed for 30 days over his time at Camp Lejeune?

A. Likely not, based on his time and his testimony.

Q. You also say "at sufficient concentrations." What are you referencing when you say that?

A. So again, I'm using what has been found in the observational studies in combination, again, with the mechanistic data, with the known biological plausibility of how these carcinogens affect tumor cells and normal cells becoming tumor cells.

So knowing that, you know, some of the epidemiologic studies list it at, you know, X concentration -- like, for example, TCE and PCE at 5 parts per billion -- that those were sufficient -- those patients in those groups, with that minimum exposure, were -- had an association with, you know, non-Hodgkin's lymphoma.

So the fact that his exposure was well beyond that, particularly for TCE, in combination -- interpreting that in combination with the known

underlying mechanism of how these compounds affect the cellular processes is why I consider it sufficient.

I specifically did not say that it was a -- met a threshold, because you really can't define that in this context, in something that's a known carcinogen, where you would -- you would do a particular randomized controlled trial and have different levels of exposure that are known, and therefore develop somewhat of a -- potentially develop a somewhat of a threshold. You can't really do that in this case.

But what helps in this case, and what is so striking in this case, is the known genotoxicity and immune dysregulation and immune suppression that occurs with these volatile organic compounds that would lead to a non-Hodgkin's lymphoma, in particular a diffuse large B-cell lymphoma, in combination with what we know and what we have of the epidemiology.

So that's how I'm using the word "sufficient," is because based on the amount, in combination with everything else, that that was sufficient for being, at least as likely as not, a cause for his diffuse large B-cell lymphoma.

Q. And the amount that he was exposed to is

the numbers that you got from Mr. Maslia's report in consideration with the time frame in one to two days per week that he was there, and the 1 liter he would have had when he was at Hadnot Point?

MS. GJONAJ: Objection. Form.

THE WITNESS: Well, again, approximately 1 liter. Like I said, I believe it was a little more. And as I said, the -- the Department of Justice expert actually said it was likely even more than that, and that Dr. Reynolds underestimated it.

But again, based on that CTE level that was listed -- I believe it was 1.2 or something, as I've already testified to you a couple times -- yes, based on all of that, in combination with the -- all of the mechanistic data and everything, that all is -- again, none of these are in a vacuum. I don't interpret any of these studies or any of these elements in a vacuum.

You really can't do that to form any sort of causation opinion when looking at any particular case, unless there's something that's clearly overwhelming, like it's an HPV-associated malignancy and the person's

HPV-positive. You don't really need to know anything else, other than it's HPV-positive. You have evidence of HPV. This is a known HPV-associated malignancy.

Those cases are easy. Other cases are not, and take a lot of incorporation of a lot of different science, a lot of different studies, a lot of different mechanistic biological plausibility data. It's not just as simple as looking at a few things, or looking at how much -- you know, whether he had 1.2 or 2.2 liters per day. It's kind of taking everything into account.

Otherwise, I think you're more likely than not, you know, not going to have an opinion that you could really stand by, unless you really look at everything in any particular case -- as much as you have available to you, at least.

BY MS. HORAN:

Q. Would you consider the amount of exposure to be an important factor in drawing your conclusion?

A. I would say it is a factor in drawing my conclusion, along with all of the other factors.

Q. You also say that the exposure -- strike that.

You also say -- and I read this -- that that was an exposure consistent with the ATSDR report and the congressional 30-day time frame. Is the ATSDR report that you're referring to there the same one that we've been talking about, the 2017 assessment of the evidence?

A. Yes, that's my understanding.

Q. And the congressional 30-day time frame, what are you referencing there?

A. Well, we've already -- I thought we've already talked about that. In the Camp Lejeune Act of -- whatever it was, 2022 -- that the ATSDR referenced in the beginning of -- or towards the beginning of their publication.

Q. Do you rely on Congress's 30-day assessment of the time frame to determine that 30 days of exposure is a -- a sufficient time frame?

MS. GJONAJ: Object to form.

THE WITNESS: No.

BY MS. HORAN:

Q. Sorry --

A. No. I would say it was -- I said -- I said "no."

I was saying that it was consistent with that. I didn't say that I relied on that, or that I

was only using that as a basis for my opinions. I'm just simply saying it matches what they have listed as a qualification for, I guess, evaluation in this context.

Q. How much -- if you have an opinion, how much did Mr. Vidana's exposure to water at Hadnot Point increase his baseline risk of developing NHL?

MS. GJONAJ: Objection. Form.

THE WITNESS: Well, again, that's -- he got -- he got a non-Hodgkin's lymphoma, so I guess 100 percent in his case. I mean, there's no way to -- I'm saying that with some humor, because there's really no way to say how much it increases risk when he actually developed it.

It would be more accurate to talk about -- to look at other data, and say how much does it increase his risk of developing a pancreatic cancer or a kidney cancer? One -- something that he has not, as of yet, developed.

But there's really no way to go back, retrospectively, and say how much of a risk it increased, because he developed it. And it's kind of something that -- again, that data -- we don't really know the real answer, because of the misclassification based on exposure limits

and -- well, based on the exposure groups, I should say -- because we don't really know what the true relative risk is.

And I don't think, for something like this, you really can know with any, you know, absolute certainty, how much a particular carcinogen, that is a known carcinogen, where a -- many randomized controlled trials haven't been done, to say in any individual case what one particular exposure increases someone's risk.

For him, unfortunately, he developed and was diagnosed with a diffuse large B-cell lymphoma. And based on my evaluation of his entire medical record that I had access to, and knowing all of the subclassifications and etiologies for causes of diffuse large B-cell lymphoma, again, it's my opinion that regardless of how much it increased his risk, that was a cause of his diffuse large B-cell lymphoma.

BY MS. HORAN:

Q. You mentioned in your answer the misclassification of exposure groups?

A. Right.

Q. Is that reference to the epidemiological

studies you were discussing earlier today, the difficulty of determining exposure in those studies? Or what were you referencing?

A. Right. So I believe that was in Bove, where they talked about, you know, the nondifferential exposure and misclassification, and how it would have been more likely to bias the results towards the null. So not representing a true relative risk for any individual exposed to that, based on the fact that some of the individuals that were not exposed were included in the exposed group.

Q. Is it possible to determine the increased risk of someone for developing non-Hodgkin's lymphoma who was at Camp Lejeune for six or seven weeks, and who was exposed to contaminated water at Hadnot Point for one to two days a week of those six to seven weeks, and was exposed to approximately 1.2 liters of contaminated water on those days?

MS. GJONAJ: Objection. Form.

THE WITNESS: So again, it's -- if you're -- you're obviously repeating the criteria for Mr. Vidana. And so, again, that's kind of a -- a moot point, because he developed diffuse large B-cell lymphoma.

Now, taking that away, and just looking

at -- at those particular risk factors, if someone -- I think it's no question, based on all of the data, that their risk would be increased.

Now, if you want to say how much would it be increased, I think that would be very difficult to give an exact number, because of all the limitations of the epidemiologic studies which have been done with respect to this location, being at Camp Lejeune, because of all the other extenuating circumstances that -- weaknesses in the study that inhibit you from being able to really know what a true relative risk would exist for any individual person.

But that is not the issue at the -- at case -- at the case here. The issue is, was his level of exposure, at least as likely as not, a cause for the development of a malignancy that he did develop and was diagnosed with in 2007? And again, that is my opinion, that it was.

And so the fact that you can't, you know, exactly quantify what a risk would be, whether it would be 1.15 or 1.89 or 2.7, for the people that actually develop the malignancy, it doesn't matter what their risk was. If it was elevated,

that means some of them get it. That means when you take a million people, some of the million people got it when they likely would not have been diagnosed with that without that exposure.

So it doesn't really matter, when you're talking about an individual that actually developed the malignancy. Which, again, is what we're talking about here, which, again, is why MCLs don't really matter, and it doesn't really -- in the context of, you know, talking about a level of exposure, because those are meant for -- to serve as a public health risk assessment for people without disease. We're talking about people that have disease.

So I think all of that is what you have to take into account, knowing that you can't really give a specific number as an elevated risk for any individual prospectively, because it would really depend on their own personal factors.

And you can't really think about any of this and interpret any of this in a vacuum; it all has to be taken with the weight of the evidence to assess any individual's risk. Not just one aspect or one exposure, and what would that risk would be, because based on the studies

that we have, without being an unethical study, which is how would you be able to come to that conclusion or -- or develop those kinds of numbers, you can't really do it otherwise.

But that doesn't preclude you from being able to come to the conclusion, to a reasonable degree of medical certainty, that a particular exposure is a cause of a particular disease.

BY MS. HORAN:

Q. Is it your opinion that evidence that exposure can cause an ailment, and evidence of the exposure and the later development of that ailment, proves causation?

MS. GJONAJ: Objection. Form.

THE WITNESS: Could you read that again?

BY MS. HORAN:

Q. Sure. Is it evidence that -- strike that.

Is it your opinion that evidence that exposure to a particular contaminant can cause or are associated with an ailment, and evidence that a particular individual was exposed to those chemicals, and then later developed that ailment, proves causation?

MS. GJONAJ: Objection. Form.

THE WITNESS: Again, it -- not -- not

necessarily. It would depend on all of the circumstances.

So again, to go back to smoking, to emphasize this, in my expert witness work on the defense side, would be that there are many people who are smokers who develop a malignancy that's known to be associated with smoking. But based on either their amount of exposure, their duration of exposure, or other particular factors associated with the tumor biology, what they were actually diagnosed with would not necessarily prove or be indicative that that exposure, being smoking, caused that generally smoking-related malignancy.

Because you have to look at all of the factors, which is what I did in this case. I went into great detail, elaborating on all of the factors, all of the known causal risk factors, in coming to a -- to a conclusion based on all of the data.

BY MS. HORAN:

Q. Had Mr. Vidana never gone to Camp Lejeune, he still could have developed non-Hodgkin's lymphoma, correct?

A. Anything's possible. Yeah, he could have

developed a non-Hodgkin's lymphoma. He could have -- that -- that doesn't -- you know, just because I go out in a lightning storm and am struck by lightning doesn't mean that the next lightning storm I go out in, I'm going to be struck by lightning.

I mean, again, as I already elaborated on, there's nothing specific about diffuse large B-cell lymphoma related to the carcinogens that are in the water -- that were in the water at Camp Lejeune. So there are people -- as I've gone through a variety of times -- that are exposed to various other infections and other things that can give rise to diffuse large B-cell lymphoma.

But you don't associate a particular disease as being idiopathic -- which is what you're insinuating, based on that question -- if you actually have a known cause.

Q. Sure. And if Mr. Vidana hadn't gone to Camp Lejeune and he still developed non-Hodgkin's lymphoma, you would have included him in the vast majority of NHL cases where there is no known cause?

A. Yeah. Again, it would depend on the particular circumstances. Because now you're using a hypothetical, because he did go to Camp Lejeune. But it would depend on the other circumstances. So

again, it would depend on the particular case.

But if everything else was the same in this case, then I would not have a -- a cause where I would be able to say, you know, if he had not gone to Camp Lejeune, I would not have what is a known cause that is, at least as likely as not, associated with diffuse large B-cell lymphoma.

But that's not the case with Mr. Vidana.

Q. We've been going about an hour. Do you mind if we just take a ten-minute break?

A. Sure.

VIDEOGRAPHER: All right. We're going to go off the record. 4:11 p.m.

(A recess transpired from 4:11 p.m. until 4:19 p.m.)

VIDEOGRAPHER: Back on the record at 4:19 p.m.

BY MS. HORAN:

Q. I'm putting back on the screen your report, Dr. Michaels, which is marked as Exhibit 1.

Do you see Section VII is on -- or the beginning of Section VII is on the screen?

A. Yes.

Q. Okay. In doing your literature search in forming your opinions, did you, to the best of your

knowledge, add any new studies that were not included in the general causation expert reports that you reviewed?

A. I -- I did not go line by line and look at what they included to know that if I cited studies that they did not include. I didn't feel that would -- would be a good use of my time.

Q. Turning to page 8, do you see the Section B that starts with "Trichloroethylene"?

A. Yes.

Q. When assessing the amount of exposure in the situation that Mr. Vidana was in with Camp Lejeune, which of these studies that you cite to in your report did you find most informative?

MS. GJONAJ: Objection. Form.

THE WITNESS: Well, I didn't really think about it as what study is most informative. I kind of look at all of the studies, and they all may inform different aspects of my opinion, because my opinion isn't one unilateral, you know, opinion that is based on one particular study, or the weight is based on one, et cetera, although you definitely go through individual studies and weigh them, the evidence stronger than others.

When forming an overall opinion, I don't then keep a sheet of which study, in a hierarchical order, I weighed higher than the others. If I cited it and included it, then I incorporated those findings into my overall opinion.

BY MS. HORAN:

Q. Did you find any of the studies that you cite to in your section on TCE, did you find any of those had a similar exposure pattern as that of Mr. Vidana?

A. I would have to open up every single one of those references and specifically go back with that question in mind. I don't specifically, as I sit here, recall any exact exposure pattern.

But you don't typically see that when trying to correlate any individual patient with any individual study. That's why, in medicine, we extrapolate based on overall findings in the medical literature to a particular patient, and -- and make assumptions or extrapolations based on what we have in the medical literature, and the particular case, and how it applies to any individual patient.

So I didn't really go looking to see if someone had that degree of exposure, but I also know

that a lot of the other exposure cases and exposure studies didn't have the degree, for example, of TCE in the water that was seen at Hadnot Point in Camp Lejeune.

So it would be hard to go apples for apples and compare any particular study, because maybe there were some studies where individuals were exposed for three months instead of six weeks, but that the micrograms per liter were 50 as opposed to 500, for example.

So you kind of have to look at everything in the context of the research, and extrapolate based on the available data that you have.

Q. Sure. So you, as part of your methodology in forming your expert opinion, did not take Mr. Vidana's exposure assessment that you made and compare it to the epidemiological studies to determine if -- if one particular or a couple particular applied, based on the similar exposure patterns?

MS. GJONAJ: Objection. Form.

THE WITNESS: That's not at all what I said. I said I did not specifically note that any of them had the exact exposure pattern, but that based on the results in those studies, and

that -- the exposure pattern that was there, I then extrapolate and apply those findings and those durations and levels of exposure to whatever particular case I'm looking at; in this case, Mr. Vidana.

So I'm not saying that I did not take into account his exposure level, because of course I did. And I mentioned that in my report, that -- and we already -- you already read on the record, in the conclusion, me talking about sufficient level of exposure for a sufficient duration. We already discussed that.

So of course I did that, but what I'm saying is I was not specifically only evaluating a study to find studies that had the exact exposure pattern that Mr. Vidana had. That's all I'm saying.

BY MS. HORAN:

Q. On your report, on page 8, do you see the citation -- it's footnote 27 -- to Hardell. And then the associated sentence is nine lines into the last paragraph.

A. Yes.

Q. Okay. And that sentence reads: "A study of histologically confirmed non-Hodgkin lymphoma

cases in Swedish workers exposed to various solvents, found markedly increased risk with exposure to TCE (RR equals 7.2; 95 percent CI, 1.3 to 42), in which even relatively short-term exposures under 30 days (1 to 17 days) were associated with an elevated risk for non-Hodgkin lymphoma (RR equals 6.5; 95 percent confidence interval, 2.1 to 18)."

You see that sentence?

A. Yes.

Q. Okay. And the citation and support for that is the Hardell study?

A. Yes.

Q. And I've put that in the chat. Let me share it on the screen, though.

A. Okay.

(Exhibit 8 was marked for identification.)

MS. HORAN: I'm marking as Exhibit 8 -- this is a study from 1994, by -- lead author is Leonard Hardell, and it's titled "Exposure to Phenoxyacetic Acids, Chlorophenols, or Organic Solvents in Relation to Histopathology, Stage, and Anatomical Localization of Non-Hodgkin's lymphoma."

BY MS. HORAN:

Q. Is this the study that you relied on,

Dr. Michaels?

A. Yes.

Q. I'm going to turn to the bottom of page 2. Are you looking at the screen, or do you have it up on your computer?

A. Both.

Q. Okay. If you look at the bottom of page 2, do you see "Pheno" -- the section on "Pheno" -- Y-X-A-C-E-T-I-C -- how do you say that word, Dr. Michaels?

A. Phenoxyacetic.

Q. Phenoxyacetic? Okay.

A. Yeah.

Q. Okay. TCE is not a phenoxyacetic acid, correct?

A. Correct.

Q. Okay. Turning higher, to the top on page 2, the column on the right --

A. Okay.

Q. -- is about the -- the -- I guess from the first page to the second page, do you see it's bolded, "Phenoxyacetic Acids"?

A. Say that again?

Q. Sure. From the bottom of the first page to the top of the second page, there's a paragraph

that's -- the first two words, bolded, are the "Phenoxyacetic Acids." Do you see that?

A. Uh-huh.

Q. All right. And the last -- it's the first full sentence on page 2. It reads "Exposures of 1 to 17 days yielded OR equals 6.5 (2.1 to 18)"? Do you see that?

A. Yes. Yeah.

Q. I -- I wasn't able to find it. If you could point me to where it is, or if it's this, the "6.5" and then "2.1 to 18" is in your report, related to TCE. Is -- are those numbers related to TCE, or was there someone else -- somewhere else in this study that -- that has those numbers?

A. I'm reviewing it.

So it looks like that's a typo, because that is not associated with trichloroethylene. In fact -- yeah, the 7.2 is accurate, but that short-term is not associated with trichloroethylene, in my rereview of this.

In fact, interestingly, there -- they reference a -- an odds ratio of greater than -- or odds ratio of 11 for exposure to degreasing agents, including benzene and trichloroethylene, which again would speak to that additive or synergistic effect

with two compounds that are both found in the water in Camp Lejeune.

Q. And are you reading from page 2, the paragraph, bolded, that starts with "Organic Solvents"?

A. Yes.

Q. And that "OR" you're referencing is from the sentence "Exposure to degreasing agents gave OR 11 (2.9 to 72)"?

A. Right.

Q. Okay. And the "7.2" that you have in your report, is that from Table 2?

A. Correct.

Q. Okay. And that's based on four cases?

A. That's correct. And that's the problem with all of these studies with epidemiology, which is why you have to include -- even though that is markedly statistically significant, in this context, with an odds ratio of 7.2, I mean, just objectively speaking, that's a very high odds ratio.

Again, I -- you would never take this one study alone. You would interpret it in the context of all of the other studies and all of the other mechanistic data with respect to how we know TCE causes particular non-Hodgkin's lymphomas with their

genotoxicity and immunomodulation and immunodeficiency and increased chronic inflammation and, you know, increased interleukin 6 and TNF alpha, et cetera. I mean, the list goes on and on for how they cause their initiating events -- and promoting effects, for that matter -- of a non-Hodgkin lymphoma, including diffuse large B-cell lymphoma.

But because, when you deal with further subtypes of malignancies, you know, non-Hodgkin's lymphoma is an uncommon malignancy in general. So when you're trying to get any sort of statistics, it's hard to go based on just epidemiology alone, especially when you can't, for ethical reasons, do randomized controlled trials. So you have to take everything into account when evaluating the weight of the evidence.

Q. Turning back to your report, which is marked as Exhibit 1, and I turn to page 9. There's a Section C on PCE.

The end -- the last sentence of the first paragraph cites to a -- a study by Dr. Goodman. And the sentence reads: "A relatively recent review published in the literature by authors employed by Gradient, a private environmental consulting firm involved in litigation, purported to conduct a

systematic review of the literature regarding the association between PCE and non-Hodgkin lymphoma and concluded that the evidence did not support a link between exposure and malignancy."

A couple of times today we've referenced Dr. Goodman. Is this the study that you were thinking of for Dr. Goodman?

A. I mean, that is -- that is -- Dr. Goodman is the first author, but I -- I don't know if it's "the study." I don't know if I've only seen her name once. It sounds familiar.

Q. I believe that you referenced earlier that the level of association between PCE and non-Hodgkin's lymphoma, that the ATSDR concluded that the association level was lower than the association levels for -- strike that. Let me try again.

I believe you had mentioned earlier that the ATSDR found that the level of evidence of an association between exposure to PCE and the development of non-Hodgkin's lymphoma was lower than that -- lower for PCE than it is for TCE and benzene.

MS. GJONAJ: Objection. Form.

THE WITNESS: Are you going to ask a question? You just --

BY MS. HORAN:

Q. Sure. Is that your understanding? I think you testified that that was your understanding.

A. Is that a -- correct? Or -- I mean, are you asking me, is that my understanding?

Q. So I want to make sure that -- I believe you said that, and I'm going to ask you if you agree with the ATSDR. But I want to make sure that I'm understanding what you're -- what you believe it is, I guess.

MS. GJONAJ: Object to the form again. And if you're going to ask him about a specific document, I think you should let him see the document.

THE WITNESS: That's exactly what I was going to ask, if we could pull up the document and go to that portion.

BY MS. HORAN:

Q. Sure. Well, let's set the ATSDR aside, then, for a minute.

A. Okay.

Q. Do you believe that the evidence of association between a link between exposure to PCE and the development of NHL is lower than, you know, the weight of the evidence for TCE and benzene?

A. I would say, based on --

MS. GJONAJ: Objection to form.

THE WITNESS: I would say, based on the overall literature, that in general, what's reported and what's in the literature currently appears to show that the risk associated with TCE and benzene, and further associated non-Hodgkin lymphoma, particularly diffuse large B-cell lymphoma, is more robust than what's available for PCE in the literature.

BY MS. HORAN:

Q. I've turned to page 11 of your report. And looking at the top, it says, the first full sentence: "A separate large Chinese study published by the same group also found that workers with 10 or more years of exposure to benzene had a significantly increased risk of developing non-Hodgkin lymphoma (RR equals 4.2; 95 percent CI equals 1.1 to 15.9.)"

And that cites to your footnote 44, which is Hayes, 1997. Did I read that correctly?

A. Yes.

Q. I've put it in the chat, if that would be helpful to you, but I'll also pull it up on the screen.

MS. HORAN: I'm marking as Exhibit 9 --

this is a study -- "Benzene and the Dose-Related Incidence of Hematologic neoplasms in China." The lead author is Richard B. Hayes.

(Exhibit 9 was marked for identification.)

BY MS. HORAN:

Q. Dr. Michaels, is this the study that you relied on in your report?

A. Yes.

Q. Turning to Table 2 -- let me zoom in a little.

You cited in your report the -- the numbers from Table 2 for greater than 10 years. Correct?

A. Yes.

Q. And you would agree that for a duration of 5 to 9 years, the 95 percent confidence interval does not show that there's a statistically significant increase for risk of developing NHL?

A. Where are you talking about?

Q. Sure. So "NHL" is the second disease. And then if you go over to the -- I'll say the third column -- you see it says "Duration, years"?

A. Yes.

Q. Okay. And the -- of "Duration, years," there's three options. It's less than 5 years,

5 to 9 years, or greater than 10 years. Do you see that?

A. Yes.

Q. Okay. And for greater than 10 years, that's what you -- you put in your report. I think you -- you said it in the report as well.

A. Yes.

MS. GJONAJ: Objection. Form.

BY MS. HORAN:

Q. And for 5 to 9 years, the RR is 3.3 and the 95 percent confidence interval is .7 to 14.7. Do you see that?

A. Yes.

Q. Okay. So for exposure for 5 to 9 years, there's no statistically significant increased risk of developing NHL, according to this study, correct?

MS. GJONAJ: Objection. Form.

THE WITNESS: So there's no -- the statistical significance is not reached in that number.

BY MS. HORAN:

Q. And the same is true for duration of exposed to less than 5 years, correct?

A. That's correct.

Q. Why did you cite statistics for over

ten years when Mr. Vidana was here for less than -- or strike that.

Why did you cite to the statistics for over ten years in your report when Mr. Vidana was exposed for less than two months?

A. Well, again, in general, what you -- the prior -- one of the prior articles that you put up, you made a point, even though it was statistically significant, of pointing out that there were only four cases. What you're failing to do, for the record in this case, is that the under 5-year duration, there's only one case in that group.

So I find that kind of misleading, that you're cherrypicking the information that you choose to show, when you choose to show it, when it fits your narrative.

So what I've done is I've gone through all the literature. And with respect to under 5 years, even if there had been one that had been -- if there had been another patient in there that had, you know, more cases than that, there weren't a total number of a lot of cases in that study. And so it's hard to base any sort of information based on a small number of cases that are evaluated in this. So it's hard to form any sort of opinion.

And when you're dealing with genotoxicity, which is what you're dealing with with benzene, the time, as we already elaborated and as I already testified to, when you're talking about initiator, or something that's genotoxic, that there's only so much that you can make from duration, because these are genotoxic substances. And so you -- you again -- you evaluate the entire literature and the weight of the evidence when you're trying to make any sort of formal opinion.

So it's not that I only chose to do one. This was a study that -- if you review all of it, I mean, I didn't choose to talk about the parts per million, and the constant parts per million, and the cumulative parts per million. This is just one element of a study that looked at non-Hodgkin lymphoma and benzene, which, regardless, is known to be -- have sufficient evidence -- not just because I said it, but because IARC has said it, and ATSDR has said it -- that benzene is a cause of a non-Hodgkin lymphoma.

Q. The number of cases in the Hayes study that looked at duration is a total of 16. Correct?

A. Correct. And only one of them was under 5 years. So again, 16 cases, when you're talking

about a disease that there are 8,000 new cases of diffuse large B-cell lymphoma diagnosed every year, is not a lot. So to try and make any sort of analysis on the number of cases when you're talking about exposure levels that are very small, you're talking about numbers of patients in the study that actually have diffuse large B-cell lymphoma -- or non-Hodgkin lymphoma; we don't even know if those are even diffuse large B-cell lymphomas.

There's only so much you can go by. You have to -- again, that's why you just can't take one article and -- and show it and say, "Well, look, well, that study didn't show it. There you go."

No, that's why I had -- I spent hours and hours looking at all the references, because this is non-Hodgkin lymphoma. That -- the cases that were associated could have been mantle cell lymphoma; they could have been marginal zone lymphoma; they could have been follicular lymphoma.

Now, diffuse large B-cell lymphoma is the most common lymphoma in the United States, but this is China, so maybe there was a Burkitt lymphoma, because Burkitt lymphoma is more common in China.

So you have to basically look at multiple studies and go based on a lot of evidence to come to

any sort of conclusion.

Q. One of the studies that you referenced earlier today is -- and correct me if I'm wrong, but the -- the Nilsson study. It's footnote 46.

And I can read the sentence into the record that associates with it: "A study of two cohorts of male Swedish seamen exposed to cargo vapors from gasoline and other petroleum products containing benzene reported a statistically significant increase in non-Hodgkin lymphoma (OR equals 3.3; 95 percent confidence interval equals 1.1 to 10.6) in those workers with at least one month of an exposure history, including a noted significant exposure-response relation when evaluating all lymphatic and hematopoietic malignancies."

Do you see that sentence?

A. Yes.

Q. And I believe you referenced this study earlier today when you were talking about duration?

A. I don't remember specifically referencing this study.

I -- I mentioned the name?

Q. I believe -- well, the record will speak for itself, but we'll just proceed forward.

I've put it in the chat.

A. Okay.

Q. And I'll also put it up on the screen.

(Exhibit 10 was marked for identification.)

MS. HORAN: I'm marking as Exhibit 10, this is a study by Ralph Nilsson, titled "Leukaemia, lymphoma, and multiple myeloma in seamen on tankers."

BY MS. HORAN:

Q. Is this the study that you relied on in your report?

A. I believe so, yes.

Q. Turning to Table 1, the total number of non-Hodgkin's lymphoma cases considered in this study was 17. Is that correct?

A. Right. That's in the 1960 cohort.

Q. And then in the 1970s cohort, there was another additional 20. Is that correct?

A. Correct.

Q. Okay. And the increased risk, that you cite to in your report, is that there was an increased risk if the individual was on a chemical or product tanker, but not if they were on a crude oil tanker only. Correct?

A. I have to look at my report.

Q. Does Table 1 support that that there was an increased risk if an individual was on a chemical or product tanker, but not if they were on a crude oil tanker only?

A. Again, I have to review what I said in my report.

Q. Okay.

A. So could you repeat your question?

Q. Sure. Table 1 shows that there was an increased risk if the individual was on a chemical or product tanker, but does not have the same increased risk if you were on a crude oil tanker.

MS. GJONAJ: Objection. Form.

THE WITNESS: Correct. So it's the 1970 cohort versus the 1960 cohort.

BY MS. HORAN:

Q. Under "Exposure," the third paragraph down, the first sentence reads: "The seaman was classified as exposed to cargo vapours, if he had worked for at least one month as a mate, boatswain, able seaman, or pumpman on a chemical tanker, product tanker, or crude oil tanker, which included oil-bulk-ore tankers." Do you see that sentence?

A. Yes.

Q. How does that exposure compare to

Mr. Vidana's?

MS. GJONAJ: Objection to form.

THE WITNESS: Could you repeat that?

BY MS. HORAN:

Q. Sure. The way they classified exposure in this study -- I read one sentence, but you're obviously welcome to read more.

How would you compare that to the exposure, Mr. Vidana's exposure, to water at Camp Lejeune?

MS. GJONAJ: Objection. Form.

THE WITNESS: Well, only in the sense that that exposure -- and again, this is what you do with these observational studies, epidemiological studies, is try and assign a group to prevent misclassification that would be more likely exposed to a particular carcinogen in comparison to those that are not likely exposed to that carcinogen.

So that's how I would compare Mr. Vidana being at a location where he was exposed to a known -- to known carcinogens and that that's the comparison here, is that what these authors are trying to do is assign these groups in a way that you can be assured that there is minimal

misclassification of nonexposed people in an exposed group.

So that's the analogy that's -- that's being done here. Again, as I said earlier, you can never find a perfect scenario that exactly matches any particular case or any particular subject or any particular patient; that you have to use other study designs that have been used in order to -- to classify exposure to certain chemicals and carcinogens and apply that information to whatever case you're dealing with at the time, in the context of all of the other information in addition to the epidemiology.

MS. GJONAJ: Can we pause for just one second? I'm curious how much -- how long we've been on the record.

VIDEOGRAPHER: Six hours and 38 minutes.

BY MS. HORAN:

Q. I'm showing on the screen -- this is exhibit -- an exhibit; excuse me -- that has been previously marked as Exhibit 2. And this is your "Materials Considered" list. And I'm turning to page 4.

Do you see that this was a study, Yu 2025, that was disclosed as a study that you had

considered?

A. Yes.

Q. Okay. And I think it just got disclosed twice, but that's the same study as this -- the first study on the next page, correct? It's the Yu 2025. Or did you mean to -- to disclose something else?

A. No, that's -- that's correct.

MS. HORAN: Okay. And I've put it in the chat, but I'll also share it on the screen.

I'm marking as Exhibit 11. This is a study by Kevin -- Kexin Yu, titled "Long-term exposure to low-level ambient BTEX and site-specific cancer risk: A national cohort study in the UK Biobank."

(Exhibit 11 was marked for identification.)

BY MS. HORAN:

Q. This is the study that you added to your "Materials Considered" list, correct, Dr. Michaels?

A. Yes.

Q. And what about this study led you to add it to -- to your "Materials Considered" list?

A. Well, the fact that they are looking at low-level concentrations of benzene, among others, specifically evaluating the risk for, in this case, 18 different site-specific malignancies.

Q. Do you know if this study controlled for co-exposures?

A. Could you say that again?

Q. Do you know if the Yu study controlled for co-exposures?

A. Well, this was looking at exposures to, you know, again, benzene, toluene, ethylbenzene, and xylene, with respect to, you know, volatile organic compounds that are in the environment.

So it's included in -- in the evaluation. So that's what the subject of the report is for.

And it separates -- it separates them individually, based on their exposure profile. So if you go to Figure -- Figure 1, I believe, separates them, you know, based on whether it's benzene, toluene, xylene, et cetera.

Q. Figure 1 is on page 4?

A. Correct.

Q. This study did not evaluate NHL subtypes, correct?

A. That's correct.

Q. Do you know if this study would be considered an ecological study?

A. Can you say that again?

Q. Sure. Are you familiar with the term

"ecological study" in the context of epidemiology?

A. I don't normally think of things in those terms, so I don't know what would be considered an ecological study. But I mean, this is published in Eco-Environment & Health, so maybe that's what it would be classified as, because you're dealing with, you know, environmental exposures that would fall into that realm.

But I don't know if that's how they would classify the study.

Q. I've turned --

A. It's more just an exposure study to me.

Q. I've turned to page 5. And the top of the page on the right column, above "Conclusion," it reads: "The exposure assessment based on residential address could not capture activity patterns of individuals, thus potential exposure misclassification might exist. Moreover, despite the adjustment of a series of confounders, we could not rule out residual confounding by other unmeasured factors that might affect the exposure and cancer incidence. Finally, indoor emissions are an important source of BTEX. The lack of data on individual indoor exposure is a common limitation in environmental epidemiological research, and the

results should be interpreted with caution."

Do you see those sentences?

A. Yes.

Q. So there's no way to know which study participants were exposed to what level of contamination in this study, correct?

A. No, I don't think that that's correct, because, you know, any author will go through their study and address limitations; but they won't then say, "Well, that means you can't rely on anything that we're saying."

Because in their conclusion, which is right below what you were reading, it says, and I quote: "Our results suggest a link between long-term low-level ambient BTEX exposure and overall cancer incidence and 18 site-specific cancers in the UK general population. Our findings carry specific public health implications and highlight the need for further research to corroborate these associations and contribute to the evidence of carcinogenic potential of BTEX."

So if they were saying in their study that basically you can't use this study to make any sort of assessments, they would not have concluded with that. Any study is going to always highlight the

limitations of the study, things to interpret with caution, the need for additional confirmatory studies.

And that's exactly what they're doing here. Again, with something that is an environmental exposure, when you're always going to have a mix of different carcinogens that may be at play, you have to do your best, as a researcher, to separate out what is a more likely chemical that's exposed or seen in a particular population compared to another.

But again, unless you have a randomized controlled trial -- which you can't ethically do for any of these chemicals that we're talking about today -- you can't really completely control for all these different variations and co-variables that you're going to see.

And some authors do a better job than others. And I think this -- this particular group did a fairly good job at trying to control for other co-variables. But again, they're always going to add in a statement evaluating what limitations they have in these studies, and there's always going to be limitations when you have any sort of environmental, occupational, or any sort of similar epidemiological study that you can't completely control for exposures

to other chemicals that would be included.

Q. I'm going to take this down.

Dr. Michaels, your opinions have been excluded by a judge before. Correct?

A. I don't know what case you're talking about.

Q. Do you know whether your opinions have ever been excluded by a judge before?

A. I think that there's something currently pending about ranitidine litigation where it's on appeal, and all of the experts were uniformly -- I don't know if we were -- I don't know the legal term, if they were excluded or not.

But as a general rule, that's not been my experience. And I -- my understanding is that that's -- that's under appeal.

Q. Are you referencing Bergen v. Ethicon?

A. No, I don't -- I don't know that.

Q. Were you an expert in Bergen v. Ethicon?

A. I -- I don't remember. I testified against Ethicon several times.

Q. Were you an expert in Childress v. Johnson & Johnson?

A. Again, I don't -- I don't -- I don't memorize all of my -- I've been involved in over a

hundred cases and had over 60 depositions. So I haven't -- I don't memorize all the different cases I've been involved with.

It doesn't sound -- it doesn't necessarily ring a bell. But I would have to see if my entire -- what you're describing, you're insinuating on the record, that my entire opinion was -- if I did a report in the case, that it was completely excluded. So I'd like to see whatever you're talking about.

Q. I didn't say "completely."

A. You said my opinions have been excluded, I think. So I mean, whether it's limited or excluded, I think you could use probably a different word to be clear for the record.

Q. Okay. Do you know if your opinions were either partially or fully excluded in a case called Childress v. Johnson & Johnson, sitting here today?

A. I don't know that. I would have to see, because usually I'm not -- I don't know that I would necessarily have been followed up with by the attorneys if any of my opinions, for one reason or another, were limited in a specific case.

Q. Have you worked on the In Re: Zantac cases?

A. Yeah, I just talked about ranitidine,

which is Zantac, yes.

Q. And you said you have testified several times against Ethicon?

A. Yes.

Q. And have you testified against Wyeth?

A. Yes.

Q. And have you testified against Zority?

A. That doesn't sound familiar.

Q. So the case Bundalo v. Zority doesn't ring a bell to you?

A. Oh, Zority? That's an OB/GYN. That's a physician.

Q. Sure. Did you testify in that case --

A. No.

Q. -- or offer an opinion?

No? Okay.

A. I -- I offered an opinion in that case. That was a -- a local case in Las Vegas about an OB/GYN that committed severe malpractice. So yes, I -- I was asked to consult on that case.

Yeah, Zority. Sorry. It was -- you were talking about different companies. And then you threw that in there so I didn't recognize it.

Q. Sure. But now you do remember offering an opinion in Bundalo v. Zority?

A. Yes.

Q. You mentioned earlier that you had received a draft of Dr. Reynolds' report before you submitted your own report. Is that correct?

A. That's my recollection, correct.

Q. Did you ever do a line by line comparison between the draft that was sent to you and the one that is listed on your "Materials Considered" list to see if there were any changes?

A. In fact, I think that I testified that I did not do a line by line comparison, but that there was nothing that I noticed that seemed different to me and certainly nothing that I focused on that would have been something that I would have relied on from her report.

Q. And one of the things that you did not rely on from Dr. Reynolds' report was her total amount of exposure final conclusions?

A. Well, I -- I saw those total exposure. I reviewed them. But based on the totality of the evidence, I looked at them in the context of all of the other data in this case. So it wasn't that I -- I didn't rely on them because I did notice them. I saw how she came to those calculations. I think that her calculations are valid based on the assumptions

that she made about timing, et cetera. But it's not something that was a huge factor in coming to the ultimate conclusion in this case I should say.

Q. And you did not include those total exposure opinions that Dr. Reynolds offers in your expert report, correct?

MS. GJONAJ: Objection. Form.

THE WITNESS: Again, so my objective -- or my expert report, I did not include any of her draft data, which is what I had at the time before it was finalized. I had reviewed it. I had, you know, evaluated it. And I ended up only using in my report that I put in writing about the actual exposure levels that were a monthly average over that same period of time which is what she also referenced in her tables.

BY MS. HORAN:

Q. Dr. Michaels, thank you very much for your time today. I have no further questions for you.

MS. GJONAJ: Can we take a short break?

MS. HORAN: Yes.

VIDEOGRAPHER: We're going to go off record at 5:17 p.m.

MS. GJONAJ: Until 8:25?

MS. HORAN: Sure.

MS. GJONAJ: Okay.
MS. HORAN: 8:25 time East Coast.
MS. GJONAJ: East Coast, yes.
(A recess transpired from 5:17 p.m. until 5:24 p.m.)
VIDEOGRAPHER: All right. One second. Stand by. Back on record at 5:24 p.m.
MS. GJONAJ: Dr. Michaels, I appreciate your time. I have no additional questions. Thank you.
COURT REPORTER: Counsel, would you like a rough draft?
MS. GJONAJ: I would, please.
MS. HORAN: We would as well.
VIDEOGRAPHER: All right. This ends today's deposition. We're going to go off the record at 5:24 p.m.
(Time Noted: 5:24 p.m.)

C E R T I F I C A T E

I do hereby certify that I am a Notary Public in good standing, that the aforesaid testimony was taken before me, pursuant to notice, at the time and place indicated; that said deponent stated to tell the truth, the whole truth, and nothing but the truth under penalty of perjury; that the testimony of said deponent was correctly recorded in machine shorthand by me and thereafter transcribed under my supervision with computer-aided transcription; that the deposition is a true and correct record of the testimony given by the witness; and that I am neither of counsel nor kin to any party in said action, nor interested in the outcome thereof.

WITNESS my hand this 18th day of August, 2025.

Karen K. Kidwell

_____

Karen K. Kidwell, RMR, CRR
Registered Merit Reporter
Certified Realtime Reporter
Notary Public

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(1) Review; Statement of Changes. On request by the deponent or a party before the deposition is completed, the deponent must be allowed 30 days after being notified by the officer that the transcript or recording is available in which:

(A) to review the transcript or recording; and

(B) if there are changes in form or substance, to sign a statement listing the changes and the reasons for making them.

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