Exhibit 179

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

IN RE:)
CAMP LEJEUNE WATER LITIGATION)
)
This Document Relates To:)
ALL CASES)

Deposition of PETER GARY SHIELDS, M.D., a witness herein, held at U.S. Attorney's Office, 303 Marconi Boulevard, Suite 200, Columbus, Ohio 43215, beginning at 9:29 a.m. EDT, on Monday, May 12, 2025, before Susan M. Gee, Registered Merit Reporter and Certified Realtime Reporter and Notary Public in and for the State of Ohio.

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Jeff Sindiong, Videographer

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I N D E X

WITNESS: PETER SHIELDS, M.D.

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VIDEOGRAPHER: We are now on the record. My name is Jeff Sindiong. I am a videographer for Golkow, a Veritext division. Today's date is May 12th, 2025, and the time on the screen is 9:29 a.m. This video deposition is being held in the offices of the DOJ, Columbus, Ohio, In Re: Camp Lejeune Water Litigation for the United States District Court for the Eastern District of North Carolina, Southern Division.

Our deponent is Dr. Peter Shields. Counsel will be noted on stenographic record. Our court reporter is Sue Gee, who will swear in the witness, and we may continue.

PETER GARY SHIELDS, M.D.

of lawful age, a witness herein, being first duly sworn as hereinafter certified, was examined and deposed as follows:

BY MR. TELAN:

Q. Good morning, Dr. Shields.

MR. TELAN: Before we get started, I just wanted to put something on the record related to a hearing we had before Judge Jones on Friday and Dr. Shields' use of a laptop computer. I understand the Court's ruling was

that he was going to be allowed to utilize the computer and that the Department of Justice was going to send their hyperlinks and materials to us. That hearing took place Friday afternoon. And at about 9:50 p.m. on Saturday, after a couple of email requests were made, we received an email sending the links.

However, and unfortunately, those links did not work, and at 10:50 p.m. last night, which is Sunday night, we received a second email from Miss Sprayregen advising that the initial links that were sent over were not working and to use the new link. That new link, however, is also not working. So as of this morning, we have been unable to vet the materials or review the materials that are contained on Dr. Shield's computer.

And rather than spend the time this morning doing that, we're just going to proceed forward with the deposition. I wanted to put that on the record.

Miss Sprayregen, if you wanted to make a comment in response to that -- Marcus. I apologize.

MR. TUBIN: That's fine.

MR. TELAN: If you want to make a response to that.

MR. TUBIN: So my understanding is after the 9:50 DOJ email, there was no further communication to the DOJ that the links did not work, and there are only a few links that are broken, and none of the links are to materials that have not been available since Dr. Shields' report was issued in this case. There's no new materials. It's all information that has been out and known.

MR. TELAN: We won't spend a lot of time belaboring this, but we were told at the hearing that we would have the materials quickly. It took more than 24 hours to get those, and they did not work. There were communications, albeit late Sunday, about that, and the links that we were provided Sunday evening still don't work.

So as of this morning, we don't have the ability to vet the materials, which we should have, and we'll hold the deposition open to be able to review those with Dr. Shields at some later point.

MS. SPRAYREGEN: I'm just going to respond to that, because I was the person at the hearing, and what we had said is that you would have the links before the deposition, and we provided them before the deposition, on Saturday night, in fact. I'll leave it to Marcus to respond to everything else.

MR. TUBIN: Yeah. I think we also offered to try and fix any problems with the links this morning, and the files had no issue working and opening on our end.

MR. TELAN: Understood. We're still unable to open those. I haven't checked within the last 10 minutes, but as of this morning, as we arrived, we were still unable to open those.

CROSS-EXAMINATION

BY MR. TELAN:

Q. So with that, Dr. Shields, you have in front of you -- first of all, good morning.

A. Good morning.

Q. Would you tell us your full name?

A. Sure. Peter Gary Shields.

Q. And you have a Department of Justice computer with you this morning at the deposition?

A. Correct.

Q. Would you tell us what is on that computer exactly? What are the file folders that are on that computer, and what information is contained in those file folders, please?

A. So there's three folders. One is the article file that you received that is searchable easily, which is the Control F. All the articles are set up by author and in the first order, too, of the article, so it's pretty obvious.

Q. How many articles are on that?

A. 1,742.

Q. Is that the exact number that was on your report, your materials-considered list in your report?

A. It probably isn't, because some of the articles in the report were not found easily, and those are identifiable in the documents you have, because there's no box, and they're in orange. So they're somewhat -- there's some missing but probably less than 40 or 50 of the 1,700 plus.

The next folder says older version of the linked report. That's the one you probably got Saturday night, which was fully working, if it's set up correctly. I assume the instructions were sent to

you on how to set it up. Simply, you just put the linked PDF in the same folder as the articles, not the linked PDF in the articles folder but next to it.

The third and final folder is something called "PLG Reports," which are the plaintiffs' reports, plaintiff expert reports, and there's two other files. There's the Word document of my report, and then there's the linked PDF of my report.

Q. The PLG reports, what reports are contained in that file?

A. Sure. Bladder cancer, GC expert report, Benjamin Hatten; bladder cancer, GC expert report, Kathleen Gilbert; bladder cancer, GC report, Laura Plunkett; bladder cancer, GC expert report, Stephen Culp; bladder cancer, GC expert report, Steven Bird.

Kidney cancer, GC expert report, Benjamin Hatten; kidney cancer, GC expert report, Kathleen Gilbert; kidney cancer, GC report, Michael Freeman; kidney cancer, GC report, Steven Bird; kidney cancer, GC expert report, Timothy Mallon; leukemia GC expert report, Lukasz Gondek; leukemia GC expert report, Timothy Mallon.

Leukemia NHL, GC expert report, Dean Felsher; leukemia NHL, GC expert report, Katherine

Gilbert; leukemia NHL, GC expert report, Stephen Bird. NHL, GC expert report, Howard Hu; NHL supplemental GC expert report, Howard Hu. Phase 1 rebuttal expert report of David Madigan; Phase 1 rebuttal expert report of David Savitz; supplemental GC expert report, Stephen Bird. That's it.

Q. Thank you. And you mentioned there was a Word doc you had as well? Is that your report?

A. Yes. Exactly.

Q. And then what was the last one, a linked file?

A. Yeah, the PDF of the report that you received first Saturday and then again Sunday, when I noticed that there was a couple of links that were not working.

Q. What were the links that were not working?

A. I don't remember offhand. They were -- when you open it up, it opens up to the wrong article. The articles were correctly cited. Plus a link was missing for the 2017 PHA water ATSDR report.

Q. This is a DOJ computer you're using?

A. Correct.

Q. And when were you provided that computer?

A. I looked at it yesterday evening, but I've never been provided to it -- provided to me until now.

Q. Did you meet with counsel in the past few days in preparation for your deposition?

A. Yes, by Zoom and then last night for dinner.

Q. And when by Zoom?

A. Saturday, Thursday and a few other times.

Q. Last Thursday and then two days later, Saturday?

A. Yes.

Q. So two days ago?

A. Yes.

Q. So you would have received the DOJ computer that you have on Sunday when you met with them in person last night?

A. I opened it up to make sure it worked, and then I gave it back to them. I did nothing more than that.

Q. So you didn't download any of the documents. Those were downloaded for you?

A. Correct.

Q. Okay. And then when you opened it up

last night, what time was that?
A. 6:30, 7:00.
Q. And is that when you noticed that there were problems with some of the links?
A. No.
Q. When was it that you noticed there were problems with the links?
A. Probably Sunday during the day. And, again, links is really like two to three links. The document itself worked fine for us and the DOJ folks.
Q. And which links did you say were problematic, other than the lacking of the 2017 ATSDR?
A. I don't remember offhand, but I started looking at the ones that my research assistant couldn't find, and then I decided not to continue that, because they were not important or critical articles.
Q. Who is your research assistant?
A. Kelly Wolfe.
Q. And she's an employee of yours?
A. I would say more like she's a consultant as a part-time sort of person that does works for me as I ask.
Q. Is she a W-9?
A. Gee, you'd think I know that. I think

she's a W-9 or she is a 1099.

Q. Okay. Do you have an LLC that you run your medical-legal work through?

A. No. Just me.

Q. You've done this before, so, obviously, you know the rules. I think probably the most important thing this morning for our court reporter's sake is that we don't talk over each other, which sometimes tends to happen, usually after lunch after we're a little tired, but if you need to take a break, just let me know and we'll do that.

A. I tend to target about every hour.

Q. You just have to ask. Otherwise, I'm probably just going to keep rolling unless you ask.

A. Okay.

Q. Are you still currently employed by Ohio State?

A. Yes.

Q. As I understand it, you went to emeritus status?

A. Correct.

Q. When did that happen?

A. July 1st of, I think, 2023. Yes.

Q. Is that the same day that you stepped down from your role as deputy director of The James?

A. No, because I stepped down the day before, so I was 24 hours unemployed.

Q. What was the reason for stepping down from The James?

A. Multi -- it's multifactorial. One of them was I was the classic burn-out post COVID. Life was extremely intense, and as typical for a lot of universities, maybe corporate America, too, our workload did not decrease, and so I was looking for ways to sort of decrease my workload overall. I was in charge of basically running the cancer center, which is $150 million budget and hundreds of millions of dollars of research. The only way I can do it was actually surgically resect it out, and so I decided to go to the emeritus status.

So I officially retired. Then I returned as a returning retiree. The emeritus title was also an honorific title. I could have just returned as a professor, and that's a 50 percent appointment. So I continued all of my research, all of my patient care without interruption. The only thing I stopped was the administrative oversight.

Q. And in terms of the administrative oversight as deputy director, what percentage of your professional time did that take up?

A. Probably -- it's really hard to estimate. I'll give you a number to understand. All of it's intermixed with both the research and patient care. So I was easily doing a 50 to 70 hour workweek every week for all of those three activities, which you can understand why I decided to start cutting some of that out.

Q. What I'm trying to gauge from you is, as the deputy director of the cancer center, you would be involved in administration of the actual center itself, the day-to-day operations of the center and the folks around you, whether it's cancer physicians, researchers and/or administrative staff, correct?

MR. TUBIN: Objection to form.

A. Right. So let me, let me define for you what "administration" means in that context. I was responsible for both developing and implementing our strategic plan, recruitment, and we were recruiting more than a hundred people per year, so I would meet with each and every one of them, including the ones that were not successful.

We have shared resources in other infrastructure, and the way I describe my job was just figuring out which researchers should work with whom, what resources they need in terms of technology or

infrastructure and how to enable them to do a better work product, if you will.

BY MR. TELAN:

Q. So setting -- and I'm going to kind of see if we can do this in buckets -- administrative tasks, clinical tasks and research tasks, I'm guessing that's kind of the three big buckets that you would put your professional time into, given your workweek that you described for us, correct?

A. Correct.

Q. So how much of your professional time was in each of those buckets percentagewise?

MR. TUBIN: Objection to form.

A. The easiest would be the clinical care, and that would be about 20 percent. That's -- I have clinic one day a week. The research would probably be 30 to 40 percent, and then the rest would be the administration.

BY MR. TELAN:

Q. So administration would be somewhere in the 40 to 50 percent range?

A. I'd say probably 30 to 50, but this is really approximate, because all of it was happening, and emails fly in, and all of a sudden, you're doing one thing and the next thing. So it's not really

trackable by a timetable.

Q. And I'm not going to have access to, like, your work records, so you don't have to worry about me --

A. They don't exist anyway. So...

Q. Okay. When I looked at the website for The James, you're not listed as a research scientist under the oncology division. Do you know why?

A. I definitely am.

Q. Do you know which section you're listed in?

A. Medical oncology. I mean, there's several websites for me. One is Find the Physician, you know, which is for patients. And then there's a separate research website that describes my research activities and labs. There's another website that is at least two for the two major brands that I'm running.

Q. And I misspoke. I apologize for that. What I meant to say is that outside of lung cancer, I didn't find you on any of the other research teams that exist at The James.

A. Okay. So I think I understand what you're seeing, but you're not -- we have clinical teams like lung cancer and breast cancer and

pancreatic cancer. Many of those folks, if not most of them, are researchers, but they're not research teams. So I think what you're looking at is the clinical teams. And at The James, like in many major cancer centers in Florida, you would have Moffat, University of Miami.

A lot of us are these superspecialists, so I only currently, since coming to The James, only do lung cancer, so that's why I'm not on the other teams. And we have people who only do breast cancer and people who only do prostate cancer.

Q. I did see that. So since 2011, your clinical team has been the lung cancer team?

A. Right. And that was different when I was at Georgetown for the prior 10 to 15 years.

Q. So The James is a bit more specialized than where you came from?

MR. TUBIN: Objection to form.

A. No. Sorry. No. It's just I've sort of changed my clinical focus from blood disorders, blood cancers to the lung cancer, and there are various reasons for that.

BY MR. TELAN:

Q. I saw that there was a hematological research team under the hematology division. Are you

aware of that?

A. At The James?

Q. Yes.

A. Yes.

Q. Are you part of that hematological research team?

A. So I guess I'm trying to figure out which website you're looking at. We have research programs. We had a leukemia research program, which is now leukemia and hematologic malignancies. We have a cancer control program. We have a translational therapeutics program. We have a molecular carcinogenesis and chemoprevention program, and we have a cancer biology program. All of us have primary assignments to each of those. I'm in the cancer control, but the nature of these cancer centers is this to be very fluid and fluster collaborations across all those programs. So I regularly work with the heme people, but I'm not listed in their research program.

Q. You don't hold yourself out at The James as a specialist in leukemia diagnosis and treatment, do you?

A. So I did that at Georgetown University, but at The James, no. We have other people who are

doing that clinical work.

Q. And you've been here for 14 years, right?

A. Since 2011, so that's roughly 14 years.

Q. You don't hold yourself out as a specialist in the treatment of non-Hodgkin's lymphoma here at The James, correct?

A. Here, I have a lot of expertise and have treated a lot of lymphoma patients, especially at Georgetown and at George Washington University before that but not at The James.

Q. And the same goes for bladder and kidney. You don't hold yourself out as an expert in the field of genitourinary oncology as it relates to the clinical diagnosis and treatment of patients who may be suffering from either kidney or bladder cancer here at The James, correct?

MR. TUBIN: Objection to form.

A. That's correct. I'm trained and have seen a lot of those patients over the years but not since coming to The James.

BY MR. TELAN:

Q. In your career at its highest point, what was the percentage of clinical time you spent treating patients with kidney cancer?

A. Kidney cancer would be primarily at George Washington University, and honestly, I don't even think I can even estimate that, because there's both outpatient and three to four months inpatient, and all the patients were mixed, so I don't really feel I could estimate that.

Q. What about bladder cancer?

A. It'd be the same answer. I just don't know how to track that.

Q. What about leukemia?

A. Again, I don't know how to track that. I mean, I certainly took care of leukemia patients, both in the hospital and in the clinic, some of those patients with acute myeloid leukemia, for example, where some of the aggressive lymphomas would be in the hospital for, you know, a month or two. We'd have a service of 15 to 20 patients typically, so there could be two to three of those, but one day, there could be a bladder cancer patient. The next day, not. I mean, it's all just mixed, so I don't know how I could estimate that for you.

Q. When you were at -- and what was the facility? Was it Georgetown?

A. Georgetown University. Before that, while I was at the National Cancer Institute, I

continued my clinical work at George Washington University.

Q. When you were at Georgetown, did you also serve as the deputy director of the cancer center there?

A. At some point. I mean, I went in initially as a program leader and became an associate director and then a deputy director.

Q. How long did you hold the administrative position of associate director?

A. So the associate directors are not per se administrative. It's not like we were dealing with budgets or anything. Our job, which is typical for these comprehensive cancer centers, is to figure out how to foster the research program overall. So it could be anything from mentoring more junior folks and writing grants and papers to helping set up some shared resource. So I don't know that I would call them administrative per se. They were really there as senior leadership to foster research programs.

Q. Would you agree that when you were at Georgetown, while you can't estimate for me with any degree of precision the percentage of patients that you would have seen with kidney cancer, that would have been a very small minority of your practice?

MR. TUBIN: Objection to form.

A. So I think I may be confusing you. So George Washington University, before Georgetown, was my clinical practice when I was at the National Cancer Institute. That was all hematology oncology. We didn't distinguish ourselves. When I moved, my research program and my clinical practice to Georgetown --

BY MR. TELAN:

Q. What year was that?

A. Around 2000. So my CV, so I may be off by a year or two. Then I focused on hematologic diseases, bloods cancers, lymphomas, blood disorders, clotting disorders. And so at that point, if I saw a kidney patient, it would be because they had a blood problem or something like that.

Q. You would never have been primarily responsible for providing oncologic care at either George Washington, Georgetown or The James to a kidney cancer patient. True?

A. No. So, again, I'm probably confusing you. At George Washington University, it was more like a general hematology-oncology practice, and we did everything from kidney and bladder cancer, breast cancer, acute leukemia, chronic leukemia, CML. George

Washington, it was the full practice that you can do as a hematologist/oncologist.

Then I move to Georgetown and then it became focused to hematologic diseases, including acute myeloid leukemias, CML, multiple myeloma, hemophilia, iron deficiency anemia. It was the full spectrum.

Then when I moved to Columbus here at The James Ohio State University Comprehensive Cancer Center, I changed that clinical focus to really better align with my research focus, which was more breast cancer and lung cancer. So I aligned with the lung cancer team to treat lung cancer patients and mesothelioma patients as well.

Q. So are you telling me, though, that in your career, there are times where you would have been the primary oncologist responsible for providing care to a patient being treated for kidney cancer?

A. Yes.

Q. And when was the last time that would have occurred?

A. That would be at George Washington University, which would be sometime around 2000.

Q. So fair statement that in the past 25 years, you would not have been primarily responsible

for providing oncologic care as the primary oncologist for a patient suffering from either kidney cancer or bladder cancer?

MR. TUBIN: Objection to form.

A. That's correct. I would not be, for example, making their chemotherapy decisions, recommending surgery, radiation therapy, but I would often work, and still do, with those physicians who are super specialists for the kidney cancer and bladder cancer and breast cancer and everything else.

BY MR. TELAN:

Q. Did your bio at Georgetown mention that you treated patients with kidney and bladder cancer?

A. Probably not, because I was focused on the heme malignancies.

Q. Have you ever published in the field of kidney and bladder cancer?

A. I'd have to go back and look at the CV. I don't recall any as a clinical paper. For example, this drug works better than that drug or something like that. I have on causes of those cancers but not as primary treatment of those cancers.

Q. We'll get to that in a bit, but your testimony is you have published on the research side of kidney and bladder cancer?

MR. TUBIN: Objection to form.

A. In terms of the causes of cancer, susceptibilities, that sort of thing, but not as a clinical therapeutics paper that I can recall. I might be on a paper or two, but it wasn't, certainly not the principal focus of the work that I've done.

BY MR. TELAN:

Q. And is it a fair statement in the last 14 years, while at The James, you have not held yourself out to the Columbus community at large as a physician who specializes in the treatment of blood cancers, correct?

MR. TUBIN: Objection to form.

A. That's correct.

BY MR. TELAN:

Q. In terms of you had mentioned you're still employed by Ohio State, you're still salaried as an emeritus professor?

A. Yes.

Q. Okay. Do you -- did you go back to school to get, like, training as an EMT?

A. Yes. I am now a licensed paramedic.

Q. When did you do that?

A. I pretty much started after I stepped down as deputy director. Their accelerated programs

for physicians, which I think are not good, because physicians are not paramedics, they're not paramedics and not just physicians who drive at 80 miles an hour. The -- but it's an accelerated program that I prolonged for, like, probably a year, a year and a half, mostly because I was getting a lot of great clinical training riding in both my hometown as well as some pretty tough areas in Columbus.

Q. Do you work for or with a company that provides emergency medical services to residents of the area?

A. Yes. So I have a part-time position with the Madison County -- emergency Madison -- Emergency Management District.

Q. And how many shifts do you do with that county?

A. Typically, I'll do a 24-hour shift about once a week.

Q. So does that represent about 20 percent of your professional time currently?

A. About 30 percent.

Q. Do you still -- you still hold clinical privileges at The James?

A. And I still see patients.

Q. Okay. And you see patients as a

physician who treats breast cancer and lung cancer or just lung cancer?

MR. TUBIN: Objection.

A. Just lung cancer. Sorry.

BY MR. TELAN:

Q. And is lung cancer under the division of medical oncology?

A. That's correct.

Q. At The James, when you apply for privileges, do you apply to divisions like if you wanted privileges to see patients who had kidney cancer, would you apply to the division of genitourinary oncology?

A. I don't think so. I don't think they distinguish that. They're more -- it's more things about are you an oncologist and what procedures are you able to do that you should be credentialed in. I don't think they distinguish it based on type of cancer.

Q. Is there a board certification requirement for treatment at The James?

A. Boy. It's actually a complicated question. So there's not a requirement. I am board certified, but we have a few docs who aren't, and the deal is that they're just not allowed to do any

education, but they have full clinical privileges, and they're great doctors, which is why there are exceptions for that. But, generally, if you're boarded, you know, that helps a lot.

Q. Are you board certified in hematology?

A. So I was board certified in hematology, and I let those go. They expire after 10 years, so I let those go around 2000. I didn't need them for my hematology practice at Georgetown. It wasn't a requirement, so I just let them expire.

Q. But you kept up your board certification in oncology?

A. So it turns out at the time I was finishing my fellowship, they changed the rules to require the 10-year renewal, but oncology, I grandfathered in, and the next year, that 10-year rule happened for the hematology when I took those boards. So I am indefinitely boarded for internal medicine as well as medical oncology.

Q. No plans on ever becoming recertified in hematology?

A. I don't have any plans, no.

Q. Are your current plans to increase your work as an EMS provider in the county?

A. I could. They'd love me to. But, no,

I'm pretty happy with my life balance right now.

Q. Do you still do research?

A. Yes.

Q. And where do you do that?

A. At Ohio State.

Q. In what lab?

A. So I have my own lab and my own clinical group.

Q. And what is the name of the lab?

A. The Shields Lab. I mean, we do have -- you know, so we have, you know, a tobacco center of regulatory science that I and another physician co-lead. So that's sort of the label of that, but on the website, you'll see the Shields Lab.

Q. Do you need to take that?

A. No.

Q. Did you, stepping away from your role as deputy director, have anything to do with your role as an expert in legal matters?

A. Not really. It made my life a lot easier, because, you know, they always -- well, outside activities are applied for, approved. There's a conflict of interest and a conflict of commitment, and I never had any issues with conflict of interest, but they were always nervous about the conflict of

commitment.

And every couple years, some compliance lawyer would say something or some dean, and they'd look at what I'm doing and say, well, he certainly has no issues with conflict of commitment given the fulfilling job that I was doing.

Q. Ohio State requires you to provide them with information, letting them know what activities you hold outside of your work as a doctor here at The James, correct?

MR. TUBIN: Objection to form.

A. That is almost entirely correct. As it turns out, when I went to apply for the Department of Justice work, they were like, nope, you don't need to do that, because it's federal government, but if I was working for you, I would have to put it in, give them the nature of what I'm doing. They review it and generally approve it within 24 hours.

BY MR. TELAN:

Q. But over the years, there were times where your superiors were, came to question you about the amount of time you were putting into legal matters, correct?

MR. TUBIN: Objection to form.

A. Yeah. That's pretty routine for, you

know, for lots of people. Basically what they want to do is just make sure that I'm not getting into a conflict of commitment and not showing up for my job.

BY MR. TELAN:

Q. What percentage of your current time is spent in the research lab?

A. Well, the research and clinical practice, again, we're talking about a 50 percent appointment over time, so 10 percent would be clinical, which is a 20 percent full-time job. So the other 40 percent then would be, you know, the research or research mentoring. So, for example, I have a large grant that trains postdoctoral fellows.

Q. And your research exclusively here at The James is on lung cancer, correct?

A. No, that's not correct. I've done a lot of work on colon cancer, breast cancer, causes of lung cancer, but a lot of it is smoking and electronic cigarettes and how they affect many different diseases, not just lung cancer.

Q. And I mean currently. Is it -- are you doing lung, breast and colon cancer research?

A. Correct. I don't think I've published in breast cancer in about a year or so. That would be on my CV. Most of my publications now are around

smoking, the harms of smoking that include lung cancer. A lot of it is on lung cancer and stress and depression affecting lung cancer outcomes.

A lot of my research is around biomarkers and how toxic exposures like cigarette smoking and electronic cigarettes affect the body, affect the lungs, what you can measure in blood. And then a lot of the colon work is both in terms of causes but, also, genetics and genetic families.

Q. You are a proponent of psychedelics, correct?

MR. TUBIN: Objection.

A. So we're in the process -- I'm not sure what "proponent of psychedelics" means, but I will tell you exactly what we're doing is that we're about to open a trial after we've gone through all the regulatory hurdles of providing psilocybin to lung cancer patients in order to reduce their stress and depression. And it's a pilot study. So we've got to get 10 patients, show that the patients will show up, show that there's no other hurdles or something like that.

We have an active program at Ohio State that I'm only indirectly involved with for U.S. veterans with PTSD, and so once we get this pilot

study done, we're planning to extend it. For example, we haven't decided yet, but for lung cancer patients entering hospice and their caregivers as, again, a way of reducing their stress and anxiety. The data around psilocybin and other psychedelics for depression, stress, even smoking, alcohol is really quite impressive, but all these studies are pretty small.

BY MR. TELAN:

Q. So you'd say you are a proponent of psychedelics?

A. I am a scientist. I'm not the proponent until I have data.

Q. Is your hypothesis that psilocybin will decrease the incidence of PTSD in the affected population?

A. Well, this one, to be more specific, it's not PTSD, but it relieves stress and depression, probably smoking as well, but that is the hypothesis. And there's data from other institutions like Johns Hopkins where they've done thousands of patients where they've treated them for a variety of disorders. It looks like exciting data, but can't be a proponent until we have our own data.

Q. Steve Wartenberg is somebody you've given interviews with on a podcast at Ohio State,

correct?

A. Yes.

Q. So if you would have said to Mr. Wartenberg that you couldn't go out and practice as a general oncologist right now, because cancer care has gotten so complicated, that would be true, correct?

MR. TUBIN: Objection to form.

A. That is true. I don't know how private practitioners in a given day will take care of lung cancer, breast cancer, kidney cancer, bladder cancer, and I sort of half joking, I say this to my patients, I don't think I'm smart enough to do that anymore.

And the point is is that that's where most cancer care is given. But people should absolutely be getting second opinions. They don't have to be treated by us, but when it's me and 10 other people who are -- we know what's going on around the world for lung cancer. You know, you've got lung cancer. You can have a great, brilliant local oncologist who treats all these cancers. At least check with us to make sure that they're getting the best treatment. So that was the context.

BY MR. TELAN:

Q. And so if somebody came to you and

said, hey, Dr. Shields, I was just recently diagnosed with large B cell lymphoma, that's not something that you would treat, correct?

MR. TUBIN: Objection to form.

A. So I get calls like that all the time. I give free advice. I make it clear that I'm not the treater, but here's what -- like, I'll either hook them up with one of our lymphoma experts and/or say here's the questions you want to ask your doc. What's going on? And I might say to them, that doesn't sound right, but you really need to see one of our, you know, full-time lymphoma experts. That happens all the time.

BY MR. TELAN:

Q. So in that hypothetical situation, you would refer that patient to a specialized colleague who deals primarily with hematologic oncology issues, correct?

A. Yes, depending on where they're located. It could be, you know, someone -- it could be a professional acquaintance, the brother of a professional acquaintance, some friend. They could be out in California. And my question for those folks is always, where are you getting treated, because that's gonna make a big difference in terms of outcomes.

Q. Have you reviewed the Camp Lejeune Justice Act?

A. I have.

Q. It wasn't included in your materials-considered list, was it?

A. I'd have to go back and look. I guess there's a couple ways I'm gonna answer that. It might be in there. I certainly have a cite to it, but it's not something that I really consider, because it's not a scientific document that's helpful to my opinion.

Q. You didn't consider that in formulating your opinions in this case, correct?

A. That's correct.

Q. When you signed -- and we'll get into your relationship with the Department of Justice in just a minute, but did you sign a contract with the Department of Justice to do work in this case?

A. Yes.

Q. When did you sign that document?

A. I'm not sure. I assume you have that. I'd say probably sometime last fall, but it might have been earlier than that.

Q. When were you first contacted?

A. Actually, I don't remember. I don't keep track of that. I don't have notes or anything

like that, so whether it was the fall or a year ago January, I just don't remember.

Q. You said you don't keep track of that. You have notes. Didn't somebody reach out to you by email or a call to say, hey, Dr. Shields, we'd like to talk to you about this particular case?

A. Likely.

Q. And you have no idea when that first contact occurred?

MR. TUBIN: Objection to form.

A. I'm worried about misremembering. I'm thinking that it could be as early as a year ago January, but I really didn't start doing work until the fall.

BY MR. TELAN:

Q. So your first contact would have come after you stepped down as deputy chair of The James. True?

MR. TUBIN: Objection to form.

A. Yes. And it's deputy director, but that's a technicality.

BY MR. TELAN:

Q. Deputy director of The James.

So sometime after July 1st of 2023?

A. Definitely.

Q. And you believe perhaps as late as January 2024?

MR. TUBIN: Objection to form.

A. That's my recollection, so it could have been earlier, but it was definitely after I stepped down as deputy director.

BY MR. TELAN:

Q. Had you done work with the Department of Justice before?

A. I don't believe so.

Q. Do you know how it is they got your name?

A. I don't know.

Q. Who was your first point of contact?

A. I don't -- I don't remember.

Q. Was it a lawyer?

A. Yes. I'm sorry. It was definitely a lawyer.

Q. Okay.

A. There's a bunch of them, so I don't remember which one.

Q. Male or female?

A. I don't remember that.

Q. What were you asked to do?

MR. TUBIN: I'm going to object on work

product here and instruct Dr. Shields not to answer that.

MR. TELAN: Just so that I can explore the objection as a work product, as to what he was asked to do when he was contacted?

MR. TUBIN: Can we take just a couple minutes?

MR. TELAN: Sure.

VIDEOGRAPHER: We are now going off record. The time is 10:12.

(A recess was taken from 10:12 to 10:23.)

VIDEOGRAPHER: We are now back on the record. The time is 10:23. You may continue.

MR. TELAN: What you said, Marcus.

MR. TUBIN: Withdraw the objection as to the contours of the assignment.

BY MR. TELAN:

Q. So the question was what were you asked to do when you were first contacted?

A. I think -- I'm not sure I had a particular task. The focus was on lung cancer and causes of lung cancer, and over time, that morphed into really focusing on the causes of all cancers or all the cancers at issue as we sit here today, and the

report that you have is essentially the final representation of what I was asked to do over time.

Q. So if I get that correctly, then, your initial discussion spoke about perhaps you looking at lung cancer, and then that morphed into the other cancers that you're here to talk about today as well, correct?

A. Yeah. I think what happened is over time, my expertise in understanding cancer causation and carcinogenesis, molecular epidemiology, my work scope expanded to really fit that expertise for the various cancers at issue today and exposures.

Q. And I did notice you've done this before, obviously. You hold yourself out as an epidemiologist as well?

A. So the short answer is yes. I do not have a Ph.D. in epidemiology, but I am recognized by my peers, including Ph.D. epidemiologists as an epidemiologist.

Q. You did your training over a couple of summers at Hopkins, I think?

A. Well, it's a lot more than that. I took some formal classes at Hopkins, but, really, it was through, you know, mentorship, post-doctoral fellowship, junior faculty such that, you know, as of

today, I'm a fellow of the American College of Epidemiology, which is an honorific title for epidemiologic contributions to the world, if you will, or to the public health community, and I'm also on their board of directors.

Q. So then you're familiar with the ethical guidelines that apply, published by the ACE, correct?

A. So I'm going to say no. I'm not sure that I've ever seen them or noticed it on the website.

Q. When you became a fellow with the American College of Epidemiology, were you provided with a copy of the guidelines?

A. I don't think so, but I'll say I don't recall.

Q. Do you agree that an epidemiologist should strive to be free from bias?

A. Sure. I think all scientists should strive to be free from bias, but the question is what type of bias are you talking about?

Q. Personal bias.

A. In terms of a conflict of interest?

Q. Yes.

A. I don't think that's possible. I think that people will have conflicts of interest, and it

gets disclosed and managed.

Q. Should you strive to be as free from bias as you possibly can be as an epidemiologist?

A. I don't know why you would be, because, for example, as I'm sitting here today for this deposition, why shouldn't the court systems have access to people with expertise such as mine.

Q. So you disagree with that?

MR. TUBIN: Objection to form.

A. The way you're asking the question, yes. There's no striving. The question is where can your expertise be offered and be helpful and disclosed so that could be evaluated.

BY MR. TELAN:

Q. Do you agree that personal bias can frame the way you judge a particular situation?

A. As a general broad statement, I wouldn't disagree with it. I don't believe that's the case with me. As I do this litigation consulting work, I try to be as objective and apply accepted scientific standards as best as I can.

Q. Do you agree that personal bias can frame the way you speak about a particular situation?

A. Again, as a generalization, that can be an issue. As I sit here today, I try to do my best to

minimize or not do that.

Q. Incidentally, I forgot to ask you this before, but with the computer, I don't know if it has Internet access, but would you agree not to access the Internet during the course of the deposition?

A. So I'll say yes with a friendly amendment that some of the links in the PDF are to URLs, and if I open it up, I will let you know.

Q. Apparently, we've checked back. We can't, as of 9:30, access the link. Do the links contain anything more than the information that you referenced in its original form?

A. No. So if it's Reference 52 to a paper by Morton from 1998, you click the link, and the Morton paper opens up, but the Morton paper is also in the article file that you have.

Q. Okay. In other words, there are no notes or summaries or anything like that?

A. There's nothing new from the original report that you got.

Q. Is the font size -- strange question. Is the font size the same font size that we would have received when we received the report in hard copy form?

A. Yes. Nothing, nothing has changed.

The only thing is the assistant, when she sees Reference 42, there's a linking thing in Adobe. She does a box, opens up the article file. She finds the article, hits it, and now that link will open up the article file.

Q. Can you access page 177 of your report?

A. Sure. Okay.

Q. Is there a table on that page?

A. There's a meta-analysis figure, if that's what you're talking about.

Q. Do you mind if I walk around you just to see what it is you're looking at?

A. Sure. So here's page 177, and then there's the meta-analysis, which I believe is from IARC.

Q. Are you able to read that clearly on your computer?

A. Yes. As I blow it up, sure.

Q. Without blowing it up?

A. So that's relative in terms of PDF, because there's no standard size. You can make it as small or as large as you want to, so but I can read it. If I see the whole page from margin to margin, I can read it.

Q. I'm just going to show you a copy of

the page 177. We won't mark this separately. This is page 177 of the report.

MR. TUBIN: My understanding is the unlinked version of the PDF can be blown up or enhanced, the one you have.

MR. TELAN: Both of them can.

MR. TUBIN: Both of them can, but especially the online version if you need to enlarge it.

MR. TELAN: I'm just asking him a question about the paper form.

BY MR. TELAN:

Q. Are you able to read that document and the table that you referenced previously?

A. It's a figure forest plot, and with my reader glasses, I can.

Q. Can you read the first three lines of the names on that table?

A. Sure. Bove, 2014a; Bove, 2014b. I feel like I'm at my ophthalmologist's. Lipworth, 2011. I'll keep going. Silver, 2014; Vlaanderen, 2013. This is a cut and paste from the actual reference.

Q. Did you do that, by the way? Did you cut and paste that?

A. Yes.
Q. So just so that I'm clear, all of the cutting and pasting that would have been done, is that done by you or by your research assistant? Who does that?
A. By me.
Q. What is your research assistant's function in regards to your report?
A. She accesses my large article file, and if there's a paper cited in the report, she'll move it to an article file for the report and then do the linkage.
Q. I lost the last bit there. I'm sorry.
A. So what she'll do is she'll take, she'll find the file from my article files, move it or copy it to an article file specific to this report and then use the Adobe linking function to link it to the document so that when you click on the reference, the article opens up.
Q. Does she bill for her services?
A. Yes.
Q. Does she bill the DOJ or does she -- do you submit her time through your invoice?
A. It's the latter. So she gives me a time sheet. I put that on the DOJ invoice.

Q. Does she bill at the same rate you do?
A. No.
Q. And how does that look on an invoice for her time?
A. It'll say research assistant.
Q. Do you know if her time appears at all on your invoices?
A. It would be research assistant.
Q. You have your invoices with you today?
A. I don't.
Q. I think you said you saw the deposition notice, correct?
A. I have seen a deposition notice, yes.
Q. Did you bring anything with you today other than the computer that is responsive to what we asked for in the deposition notice?
A. No.
Q. Have you seen your invoices in preparation for your deposition?
A. No.
Q. Does your research assistant handle the invoicing for you?
A. No.
Q. You do that yourself?
A. It's all just me.

Q. And does that come from your personal computer?
A. Yes.
Q. When would have been the last invoice you sent the DOJ?
A. I think last week or the week before.
Q. Do you remember what the amount was for?
A. No. I'd like to think it was less than 5,000, but I could be wrong.
Q. And your current hourly rate is at 890 an hour?
A. It's either 890 or 895. I just recently realized that in my billing software, there's both numbers, so I don't remember what it was for the DOJ, but it would either be 890 or 895.
Q. So if I'm correct, then, in terms of your research assistant and her role, would she have been the one to have pulled the 1,700 references that are contained in your report?
A. Yes.
Q. Did you have any assistance from any outside, anyone outside of your research assistant?
A. No.
Q. Nobody in Gradient?

A. No. No, no.

MR. TELAN: Okay. I mentioned before the Camp Lejeune Justice Act. We'll mark that as Exhibit 1 to the deposition.

(Exhibit 1 was marked for identification.)

BY MR. TELAN:

Q. Is this the document that you testified that you were shown or you saw?

MR. TUBIN: Objection to form.

A. I saw it online, so it did not have this format, but it looked similar.

BY MR. TELAN:

Q. Okay. I'll direct you to Section 804. Do you see the section that may be cited as the "Camp Lejeune Justice Act of 2022"? If you go down to subparagraph (c) at the very bottom, where it says, "Burdens and Standard of Proof," do you see that?

A. Yes.

Q. If you flip to the next page, under number 1, and I'll read it. "In general, the burden of proof shall be on the party filing the action to show one or more of the relationships between the water at Camp Lejeune and the harm."

Have I read that correctly so far?

A. Yes.

Q. Number 2, "Standards. To meet the burden of proof described in paragraph 1, a party shall produce evidence showing that the relationship between exposure to the water at Camp Lejeune and the harm is, (A), sufficient to conclude that a causal relationship exists or (B), sufficient to conclude that a causal relationship is at least as likely as not."

Did I read that correctly as well?

A. Yes.

Q. And you told me before that this is not something you specifically considered in formulating your causation opinions, correct?

A. Well, it's a legal document, so that's correct.

Q. When you signed your contract with the Department of Justice, do you remember whether that was a Form 522124 form?

A. I have no idea.

Q. You didn't bring your materials with you, the contracts that you signed, correct?

A. Correct.

MR. TUBIN: You have the production that we made with the contract and invoices,

correct?

MR. TELAN: We don't have the original contract. We have the amendment.

A. So the amendment builds on the original one, so it's just adding lines to it.

BY MR. TELAN:

Q. But I don't have the original one. So the question to you, Dr. Shields, is before you signed the amendment to the contract, you signed an original, correct?

A. Correct.

Q. And you don't know when you signed that original, correct?

A. No. We would have to look at it. It might be on that amendment document.

Q. Do you know if that contract requires that you comply with federal law?

MR. TUBIN: Objection to form.

A. I don't -- it was a multipage document. I don't recall what is in that multipage document.

BY MR. TELAN:

Q. Did you read it before you signed it?

A. I did.

Q. But you don't remember whether there was a clause that required that you comply with

federal, state and local laws as part of your work as a contractor?

MR. TUBIN: Objection to form.

A. I don't remember either way.

BY MR. TELAN:

Q. Assuming that that is, in fact, the case, you didn't actually follow the Camp Lejeune Justice Act in this undertaking, correct?

MR. TUBIN: Objection to form.

A. I'm not even sure what that means.

BY MR. TELAN:

Q. Would you agree that the Camp Lejeune Justice Act that we just read is applicable to this case?

MR. TUBIN: Objection to form.

A. For you all lawyers, that act has nothing to do with scientific, medical or public health-accepted practice.

BY MR. TELAN:

Q. That law does speak to causation, does it not?

MR. TUBIN: Objection to form.

A. It states a standard that's a legal standard that I've never heard of before I got into this case. I've not been able to see that as a legal

standard anywhere else. But, again, that's a legal standard, not something that -- I can understand the words, but I don't understand how that would impact the work that I do, based on accepted scientific, medical and public health practice.

BY MR. TELAN:

Q. What is the causation standard you typically apply as an expert?

MR. TUBIN: Objection to form.

A. So it's pretty clear in my report. There's a number of different causation methodologies. The most widely recognized, although not perfect, is Bradford Hill. And then --

BY MR. TELAN:

Q. I'm not talking about methodology. I meant the standard.

A. Then I have no idea what you're talking about, because that -- if you're talking about a medical standard -- if you're talking legal standard, I'm not a lawyer. I can't even begin to help you with those questions. The accepted scientific and medical practice would be something like Bradford Hill.

Q. Does the term "more likely than not" come up in your vernacular as an expert ever?

A. As an expert?

Q. Yes.
A. Yes. In the legal setting. In the scientific and medical setting, I'm gonna say never. If you do a PubMed search with "as likely" and not in quotes, you'll not find a single article in the National Library of Medicine 60 million papers that use that phrase in the abstract or a title.
Q. You're sure about that?
A. Yes. And maybe my search was wrong, but those searches are pretty reproducible.
Q. You're here as an expert in a legal matter, correct?
A. That's right.
Q. So what standard are you used to using as an expert in legal matters?
MR. TUBIN: Objection to form.
A. You keep using the word "standard." To me, standard implies a legal interpretation that I don't have or have the training to evaluate. In every one of my cases that I'm involved with that involve cancer causation, it's using -- I can't think of an exception, but maybe it has the Bradford Hill methodology and the weight of evidence review for sufficiency.
As, for example, as done by IARC, NTP,

EPA, those are the methodologies that I've been trained to use, that I apply, and it's consistent across all the cases I'm involved with. When I'm asked to say something like is your opinion more likely than not, my answer is always the same. Yes, it's more likely than not that I've used accepted medical, scientific and public health practice for evaluating causation, and here's my opinion.

BY MR. TELAN:

Q. Have you testified in a tobacco case that it is more likely than not that smoking caused lung cancer?

A. Yes, with the same thing, applying accepted medical, scientific public health practice for something like Bradford Hill or potentially other accepted practices in the public health community.

Q. Well, when you use that in the smoking cases, what do you mean when you use the term "more likely than not"?

A. That there was a sufficiency of evidence based on Bradford Hill and a weight-of-evidence review.

Q. Do you ascribe any percentage degree of quantitative degree of proof to the term "more likely than not"?

MR. TUBIN: Objection to form.

A. I never have, and I don't know how to do that. That, to me, is a legal thing that you lawyers figure out.

BY MR. TELAN:

Q. So you've never testified that "more likely than not" means a greater weight of the evidence or greater than 50 percent quantitatively, correct?

MR. TUBIN: Objection to form.

A. That's correct. As far as I'm sitting here that I recall, I don't recall ever doing that.

BY MR. TELAN:

Q. You had mentioned or I had asked you about your materials-considered list. Did you say you were able to access that?

A. It's in my report.

Q. Yes. Can you access that?

A. Okay.

Q. And just let me know if your materials-considered list includes the Camp Lejeune Justice Act.

MR. TUBIN: Are we talking about the documents-reviewed section?

MR. TELAN: Yes.

BY MR. TELAN:

Q. I'm sorry. I said materials-considered list, but either documents reviewed or materials considered. Feel free to look at either one.

A. So it's not listed there.

Q. Why not?

A. Because, as I said, that's a legal document that doesn't help me scientifically provide my opinions in this case.

Q. But it is a material, and it is a document, correct? Whether it's scientific or not, it is a document?

A. Yes. But it's nothing that I would consider to help me formulating an opinion in this case.

Q. I have a copy of your invoices, and I'd like to talk with you a little bit about those. We'll mark those as Exhibit 2 to the deposition.

(Exhibit 2 was marked for identification.)

BY MR. TELAN:

Q. To reference those generally, so do you see at the top left-hand corner, it states, This is amendment of solicitation? This is at Bates stamp page 1 at the bottom, and these are not my Bates

stamps. Somebody else must have Bates stamped this.

MR. TUBIN: I'm sorry. I do not see a Bates number.

MR. TELAN: What's that?

MR. TUBIN: I don't see any stamps on here.

MR. TELAN: I apologize. Somebody else must have Bates stamped it. Okay. It's not the format that I've got. All right. We'll work off this format.

BY MR. TELAN:

Q. So let's skip ahead.

A. And just looking at this, when you were asking me before about when I first started doing work, this one is dated November 8, 2023, so that's probably when I -- sometime around then was when I actually started working.

MR. TUBIN: Are you talking about the stamp in the top right-hand corner?

MR. TELAN: No. I've got something different, I think, that you all produced in response to the request for documents, and we may get that on a break.

BY MR. TELAN:

Q. Do you see in here, Dr. Shields, in

Exhibit 2, a copy of your contract that you signed with the Department of Justice?

A. Are you talking about the original?

Q. Yes. Were you able to find that, Dr. Shields?

A. I'm still looking for it. This is a -- it looks like a 60-page document.

Q. I'll represent to you that it's not in there. I don't want you to have to page through each page.

MR. TUBIN: I think he's getting close to it at the end.

BY MR. TELAN:

Q. You haven't seen it yet, Dr. Shields?

A. I'm on page 39, but if you can ask me material questions about it, then I need to keep looking.

MR. TELAN: We'll withdraw.

BY MR. TELAN:

Q. You don't need to keep looking.

You -- there is a --

A. It actually looks like it's on page 39.

Q. The original?

A. I think so.

Q. Where are you seeing page 39?

A. So at the bottom, maybe cut off on some of your things, but it says "Shields USA Contract 00000039."

Q. Can I see what you're looking at? Because I can't seem to see that.

Okay. That's a document that's dated August 22nd, 2023, correct, bottom right?

A. That's correct.

Q. But it's not signed, correct?

A. It's not signed by me, no.

Q. Did you sign the original contract that you would have received from the Department of Justice?

A. I'm sure I did.

Q. Now, the first invoice that I see, if you flip all the way to the front, was November the 8th, 2023. Do you see that?

A. I'll assume that it is the first -- are you asking me if that's on the first page or is that the very first invoice?

Q. The first, the first page.

A. Okay. That's correct.

Q. Is there an invoice that -- okay. So if I look at that November 8th, 2023, that would have been about three, two and a half months after what you

just showed me at page 39, the unsigned solicitation for contract, correct?

A. That would be right.

Q. And the description is that you were preparing a report in Associated Research and Review; is that correct?

A. That's the general description.

Q. What report were you preparing on November 8th, 2023?

A. So either -- I only really have three or four descriptions. One is report prep in Associated Research Review. One is document review; then there's testimony. So at the time, I was obviously working to help develop questions, whether it was in writing or verbally, but I would consider that a report.

Q. You would consider that a report?

A. Yes, for my billing purposes.

Q. What exactly were you doing then that you billed for on November 8, 2022?

A. It was a couple years ago. The question is development. It would have been that I was being asked to offer advice, opinions on, I'm guessing, which I'm not supposed to do, on either an upcoming deposition or for someone asking questions to

someone else.

Q. What those questions were, you can't remember?

A. I don't.

MR. TUBIN: Hold on. Are you asking him about a draft of a report or -- I'm just curious where -- I don't want to tread on any work product here.

MR. TELAN: I think the question is clear, and I think, Marc, you can object if you like, but if the doctor has a, needs clarification with a question, I think he can ask it.

MR. TUBIN: I think I'm going to object and refer to Case Management Order 17, you know, the discussions and communications. At this stage, I believe that order has identified them as privileged or work product.

MR. TELAN: So you're instructing him not to answer?

MR. TUBIN: Yeah.

BY MR. TELAN:

Q. So let me ask you so that the question is clear.

As far as report prep is concerned,

you've mentioned that you considered your report prep to be developing and responding to questions that were asked, correct, Dr. Shields?

A. So I'll clarify that. It could be either verbal or something in writing or something in email. I don't recall. But I was helping develop someone who had questions for someone else.

Q. And who that someone was, you can't tell me?

A. No. I don't track that.

Q. And you can't remember what the questions were?

MR. TUBIN: Objection. Again, we're getting into, I think, CMO 17, and I'm going to instruct Dr. Shields not to answer.

MR. TELAN: The question is simply does he remember what they are, not what were they. Does he remember what they were?

MR. TUBIN: Okay.

A. I don't recall offhand.

BY MR. TELAN:

Q. In terms of -- and these, do these represent all of the invoices to date other than the most recent ones that you just mentioned to me that you submitted sometime earlier in the week?

A. I will assume that the DOJ turned over all the invoices. I have no way of determining, as I sit here now, that this is a complete list, but I would make the assumption that if I sent it to them, they have turned it over.

Q. Does this appear to be a complete list of your invoices other than the one that you just spoke about?

A. I think so. As you're giving them to me, they're not in the date order, so it's even hard to track, but it looks like the most recent one you have is dated 4/4/25 -- no. Sorry. 4/20/25, so that's pretty recent.

Q. Okay. So if we total up the invoices here generally, you have about 2,000 on the first page, about 14,5 on the second page, 18,000, 35,000, 55,000, 11,000 and 26,000. Does that look to be about the sum total that you billed to date?

A. You haven't given me a sum, and this is higher math for me. But, again, I have no way of verifying that every invoice is here. But it appears to be, and it is, and the documents will speak for themselves.

Q. Approximately about $165,000?

MR. TUBIN: Objection to form.

A. I can pull out a calculator and add them up. If you want to represent to me that that's what it is, then I'll accept that.

BY MR. TELAN:

Q. You can't -- you're not able to quickly just look through and estimate what these invoices are?

MR. TUBIN: Objection to form.

A. I learned a long time ago that I don't like to do math in my head. It's too inaccurate.

BY MR. TELAN:

Q. I don't see any time entered from your research assistant, do you? I see one note for article retrieval, one hour on March 23rd, 2025. I take it back. Sorry about that. Withdrawn.

The first bill, I see no, no entry from your research assistant on the November 2023 invoice; is that true?

A. That's correct.

Q. If we go to the second invoice, that's on this page, not chronologically, April of 2025, I see two entries for article retrieval. One is for 69 hours, and the other is for an hour and five -- an hour and a half. Do you see that?

A. Yes.

Q. Presumably, your assistant was pulling in a good number of articles about a month ago; is that correct?

MR. TUBIN: Objection to form.

A. Yes, the 1,700-some-odd articles linked to the PDF.

BY MR. TELAN:

Q. And why was she doing that?

A. To make it easier for you and I during this deposition to find articles in an efficient way.

Q. So she pulled them and did what with them?

A. Linked them to the PDF.

Q. If we go to the next invoice of December 2024, I don't see any billing from her in that invoice, correct?

A. That's right.

Q. If we go to the next invoice from November of 2024, I think there's a mistype at the second line, because it says November 11th of 2002. My guess is that should be 2024, but I don't see any bills from her on that invoice either; is that correct?

A. I think you might have misspoke. So we'll just be clear this was a December 18, 2024,

invoice, and it is correct that there's no billing for her.

Q. Okay. Turn the page to the November 2024 invoice. You don't see any entries from her on that invoice, correct?

A. I lost track of where you are. What number page is that?

Q. On the flip side of the December 2024, you have an invoice date of November 2024.

MR. TUBIN: They're both December. Are you referring to the very first page?

BY MR. TELAN:

Q. Can I see what it is you're looking at? So you were looking at the December 2024. I asked to flip to the next one of November 2024 starting at --

A. The invoice date is 12/18/24. That's why I was correcting you.

Q. I see. So we're on the 12/18/2024 invoice date. Do you see any billing from your assistant on that invoice?

A. No.

Q. Let's go to the next invoice date, which is March 28th, 2025.

A. Okay.

Q. Do you see any billing for your

assistant on that invoice?
A. No.
MR. TUBIN: You said March? Did you mean February 28th?
MR. TELAN: Mine says 3/28/2025 due date. I'm sorry, yeah. 2/28/2025. Sorry.
BY MR. TELAN:
Q. No billing from your assistant on the February 28th invoice date?
A. That's correct.
Q. If we go to the next invoice date is April the 4th. I see one hour of article retrieval on March 23rd, 2025, correct?
A. That's right.
Q. And if we go to the January invoice date, January 19th, I see no invoicing from your assistant on that date, correct?
A. That's correct.
Q. So fair statement that your -- the only entries for invoicing that came from your assistant would have been on March 23rd, 2025?
MR. TUBIN: Let me just open the document.
BY MR. TELAN:
Q. For one hour on March 23rd, 2025, six

and a half hours on -- I'm sorry. 6.69 hours on April 12th, 2025, correct?

A. I'd have to look at the actual pages, but I believe that's correct.

Q. You authored your report on what date?

A. Well, the final was generated on February 7, 2025.

Q. So prior to February 2025, your assistant billed no time on this case, correct?

A. That's correct.

Q. Who pulled the 1,700 articles?

A. I guess I'm not sure. You asked me that before. She did for the purposes of linking the PDF.

Q. Who pulled it so that you could rely on them for your report?

A. They're in a file. There's no pulling.

Q. In a file?

A. Correct, on my personal computer. So it's like 20,000 articles in there.

Q. Do you update that file?

A. All the time.

Q. How is it updated?

A. When I identify a paper that's relevant to either my research, my clinical care or to the

litigation work, it gets dumped in there.

Q. And you do that through her? In other words, you identify it, and then you ask her to pull it?

A. No. I do it. It's just me.

Q. And how often do you do that?

A. I was going to say probably more than weekly. If an article comes up, then I put it in. For purposes of this type of litigation, I get weekly feeds from PubMed, so that if there's a paper that's published that mentions the word "benzene," for example, I'll look at that email and say, oh, that's an article that I need to consider for some future or it could be treatment of lung cancer or something, and I'll just put that into the, into the folder.

MR. TUBIN: Are you getting close to a breaking point?

MR. TELAN: I thought we just had one just about 30 minutes ago.

MR. TUBIN: It was a little bit more than that, but how are you feeling, Dr. Shields?

THE WITNESS: I'm okay for a few more minutes, yeah.

MR. TUBIN: We went back on at 10:26,

so, yeah.
BY MR. TELAN:
Q. We would request a copy of the original signed agreement between Dr. Shields and the Department of Justice, as we don't have that.
I do see, Dr. Shields, that there were a couple of amendments made to the, to the contract. Some of those were to give you an increase in your pay scale, correct?
A. One of them was, correct.
Q. How did that occur?
A. I was raising my rates generally for all my litigation. I do that every couple years, and that's what happened here, and we amended the contract.
Q. We'll come back to how often you update your materials, but in terms of the actual billing from your assistant, just so that I'm clear, the 69 hours that she billed for was to transfer the files that you have on your computer to a link.
MR. TUBIN: Objection to form.
BY MR. TELAN:
Q. Is that right?
A. Well, more or less. I mean, periodically, what I do is I send her a link for

articles that I've had added. I'll say to her, what's the last date stamp of the articles you have? She'll come back and say, January 1st, you know, 2025. So then I'll send her a link of any article that I dropped in there after January 1st, 2025.

Q. And you said you update your research regularly, right?

A. All the time.

Q. So as an expert in this case, how often would you have been updating that database?

A. All the time.

Q. Is that every day?

A. If an article comes out that's got relevance, then, yeah, it could be every day.

Q. How do you do that? In other words, is there, like, a search term that you use to update it or what?

A. Well, as in my report, there are certain keywords that I'll get a weekly update. So in the last seven days, if any article gets published about benzene, whether it's relevant -- you know, it could be benzene used for, identify genetic testing for some drug. That will be in there, because there's benzene mentioned as either the title, the keyword or the abstract. That wouldn't go in.

But if there's then a paper after that that says benzene exposure and causes of leukemia, then I'll grab that and make sure that -- I'll look at it, and then, for any subsequent report, I'll make sure that it's in there. Not a perfect system, because it's subject to human error, but that's basically the way it goes.

Q. And did you do that every day across all four cancers in this case?

A. It's not every day. It depends on whether I identify an article or not. So when I generate a report like this -- I think maybe this will help you -- I won't assume that my database of files is up to date and I'll redo the search, so I'm looking at benzene and AML. I will do another search, even though I get the weekly report, just to make sure something hasn't come out in the last year that somehow didn't get captured.

Q. Looking at -- do you still have Exhibit 2 in front of you, the invoices?

A. Yes.

Q. Have you talked with anybody outside of the Department of Justice about this case?

MR. TUBIN: Objection. I need clarity on who you're referring to, because that could

impact -- I think, again, it could touch on CMO 17.

BY MR. TELAN:

Q. Anybody outside of your lawyers?

MR. TUBIN: Again, I'll allow you to answer who, but as far as the communications go, don't answer that.

A. There were a couple meetings we had with other defense experts.

BY MR. TELAN:

Q. Who's "we"?

A. The lawyers, myself.

Q. Which lawyers?

A. Each time, it seems to vary. There's like 10 or 15 that I'm working with, and so I don't record who's on that call versus the next call.

Q. Are they reflected, those meetings reflected on your invoices?

A. Yes. It would say, simply, meeting.

Q. Can you look at your invoices and tell me when those meetings took place?

A. April 1st, 2025; December 12th, 2024; December 26th, 2024; December 6th, 2024; January 20th, 2025; February 1, 2025; February 6, 2025; February 4, 2025. I'm sorry. Did I just say February? I

misspoke.

Q. You said February 4 and February 6th and February 1st, 2025.

A. Right. So I have February 6th, 2025. The next one is April 2, 2025; April 4, 2025; January 7, 2025, and that's it for these invoices.

Q. And all of these meetings would have involved DOJ lawyers and other experts?

A. No.

Q. Which ones involved other experts?

A. I don't record that, so I can't tell you the answer to that.

Q. You can't recall -- do you recall meeting with other experts?

A. Yes.

Q. How many times?

A. Probably all totaled, maybe four or five of those meetings.

Q. Were any of those in person?

A. No.

Q. All Zoom?

A. Correct.

Q. How long did those meetings last, and when did they occur?

MR. TUBIN: What was the last, how

long?

MR. TELAN: When and how long. I know it's compound, but I figured it's easier.

A. So, again, I can't tell you when, because I don't record that. I mean, generally, they would be anywhere from a half hour to an hour.

BY MR. TELAN:

Q. Is it on one of these dates that you gave us before?

A. It would be in one of those meetings, correct.

Q. Okay. And you're certain there were two?

A. Two what?

Q. Meetings with other experts.

A. I think it was probably four, plus or minus.

Q. And who were the other experts?

A. Dr. Julie Goodman, Dr. Lipscomb, and I think there was -- I think it was just them, actually. I mean, at one point, I was meeting with someone who was a lawyer who I thought was one of the experts, because that was her expertise.

Q. Julie Goodman, Dr. Lipscomb and?

A. And I think that's, that's it.

Q. And how many lawyers were on the phone, on the Zoom?

A. I mean, it could be anywhere from one to eight. It's all those Hollywood Squares, and people would come and go.

Q. And you said it was 30 minutes to an hour for each?

A. I don't recall meeting for more than an hour.

Q. Was there an agenda for the meeting?

MR. TUBIN: Now we're getting into, I think --

MR. TELAN: And that's what was on it. I said was there an agenda.

MR. TUBIN: Okay.

A. Each meeting had a particular focus.

BY MR. TELAN:

Q. And was that published in advance of the meeting?

MR. TUBIN: I just want to be clear, so Dr. Shields understands it. We're not talking about any content on anything on this agenda or anything like that, just the facts of whether these things existed or not.

BY MR. TELAN:

Q. That's the question right now.

A. Yeah. I don't know what "published" means, but it could be in one meeting. We would say, hey, let's hop on a call with Dr. Goodman and clarify something, or it could be by email saying we want to call about X, Y and Z.

Q. When was the most recent of those meetings?

A. I don't -- not for at least the last month, but I would say probably they were in May, maybe the beginning of April, more likely March, but March, April-ish.

Q. Were these meetings close in time together or were they months apart?

A. I don't -- I don't know. I mean, they could be a couple weeks apart or something like that.

Q. Do you think, as you sit here today, that all of the meetings took place after your general causation report was finalized or were some before?

A. Some were before.

Q. Do you think it's evenly balanced?

A. I have no idea.

Q. Were any of these meetings conducted without lawyers?

A. No.
Q. Had you ever talked to Julie Goodman outside of the presence of the lawyers about this case?
MR. TUBIN: Objection to form. So discussions between the experts again, we're getting into CMO 17, I believe.
MR. TELAN: I don't think --
MR. TUBIN: We can pull it up if we want, but I believe that those discussions, and all that, have been ordered by the judge to be confidential and privileged. I forget the exact terms, but I'm going to instruct him not to answer that.
MR. TELAN: Let me ask the question, and you can make your objection and instruct him not to answer.
BY MR. TELAN:
Q. Outside of the meetings you've just described, the four to five meetings that you just described by Zoom, have you met with Julie Goodman to talk about this case?
MR. TUBIN: Objection. Dr. Shields, don't answer the question.

BY MR. TELAN:

Q. Now, let me ask it to you slightly differently. Outside of the meetings that you just described, have you met with Dr. Goodman before for any reason?

A. Not that I recall or even any communications. She did remind me that we trained in the same, she did her fellowship in the same lab that I worked with back in the 1990s, which I had forgotten about. Other than that, I don't recall any time, and I didn't recall that of actually meeting with her.

Q. We'll come back to this, but have you met with Dr. Lipscomb before?

A. No.

Q. And outside of the meetings you just talked about with these two other experts, have you talked to anybody else outside of your lawyers about this case?

A. Other than that I was involved in this case nonsubstantively, no.

Q. You haven't consulted with anybody at Ohio State about this case?

A. No.

Q. Have you disclosed to Ohio State that you are, in fact, an expert in this case?

A. So I started to, and they told me because it was federal government, I don't need to disclose that.

Q. So if you were to look at your Ohio State page, and I don't know if you've done it. There's a list of actual case involvements that you have ongoing. You're aware of that, correct?

A. So I'll give you sort of a friendly correction. There is a list, but that's actually not cases I've worked with but people who have paid me over the prior 12 months.

Q. And on that list is not the Department of Justice, correct?

A. That's correct.

Q. Or the U.S. Government or anything that would suggest that you were involved in the Camp Lejeune litigation?

MR. TUBIN: Objection to form.

A. Correct, per their, per their rules.

BY MR. TELAN:

Q. And who told you that you didn't need to do that?

A. One of the ethics officers.

Q. Do you remember the name of that ethics officer?

A. No, I don't.
Q. Have you visited Camp Lejeune?
A. No.
Q. Have you treated anyone who, for cancer, who was stationed at Camp Lejeune during the time period at issue?
A. I'm going to say sort of, which is a nonanswer. I've had a couple patients who have told me about the litigation. They were particularly not filing claims, but they mentioned in passing that this was a thing.
Q. Okay. And is that here at Ohio State?
A. Correct.
Q. And what were they treating for, what cancers?
A. Lung cancer.
Q. Are you working on any other matters with the Department of Justice?
A. No.
Q. Do you consider yourself retired from the practice of clinical medicine at this point or not yet?
A. No. I'm still seeing patients. I have an active practice.
Q. Is your intention to scale down your

clinical practice?
A. No.
Q. You have no intention of going back into the world of hematologic oncology, do you?
MR. TUBIN: Objection to form.
A. I have no intention. I doubt that I will do that.
BY MR. TELAN:
Q. And have you made any notes regarding your review of materials in this case outside of your report?
A. There are notes.
Q. And where do those notes exist?
A. On my computer at home.
Q. Have you provided those to your lawyers?
A. No.
Q. What would those notes be, generally speaking?
MR. TUBIN: Objection. To the extent those notes did not make it into the final report in some sense, they're not discoverable, and I'll direct Dr. Shields not to answer.
If they reflect anything that -- I had

that backwards. If they do not make it into the final report -- let me see exactly where we are. Sorry about that. One second.

MR. TELAN: That's okay.

MR. TUBIN: This is CMO 17, paragraph -- what's the paragraph? Three.

BY MR. TELAN:

Q. This might clear it up for you. Let me. Dr. Shields, since you've authored your report, have you made any notes relative to your involvement in this case?

A. That's relevant to my involvement? The answer would be no. I have notes, but I guess I'm not sure what you mean by relevant to my involvement. I mean, there's nothing that says my scope has changed or I'm going to do new work or something like that.

Q. I meant notes regarding the issues that you're here to talk about. Did you make any of those after your report was authored?

A. Yes.

Q. And those are on your computer at home?

A. Correct.

Q. How many pages of notes are we talking about?

MR. TUBIN: Objection. Objection. Can

you repeat the question?

MR. TELAN: I just asked him how many pages.

MR. TUBIN: No. I'm asking her to repeat the question as to how many pages of notes.

MR. TELAN: I asked him how many pages of notes there were.

MR. TUBIN: What's the prior question?

MR. TELAN: The prior question before the note --

MR. TUBIN: Yeah. How many pages.

MR. TELAN: If he made those notes after he authored his report.

MR. TUBIN: Okay.

BY MR. TELAN:

Q. And you said yes, you made them after your report, and there's one page of notes?

A. It's one to three, but it's not like, you know, I will have copied an article, the title of the abstract, so that could be, like, half a page. So there's a bunch of random sort of things with different fonts and different things, but it's, I don't know, probably two to three pages.

Q. Two to three total pages of notes?

A. Correct. Understanding that a half a page may be one note, you know, copied abstract or something like that.

Q. Have you provided those to your lawyers?

A. No.

Q. Did you bring those today to the deposition?

A. No.

MR. TUBIN: Paul, we're at about an hour since the last break. So is this --

MR. TELAN: Almost finishing up.

MR. TUBIN: Okay.

BY MR. TELAN:

Q. When you saw the notice of deposition, did you read that as requiring you to bring with you those notes that you have at home?

A. I don't recall that.

Q. Did you just make a decision not to bring them after you saw the notice?

MR. TUBIN: Objection to form.

A. No. My decision of what to bring was guided by what the DOJ attorneys said to put on the laptop, and they put the stuff on the laptop, not me.

BY MR. TELAN:

Q. But they didn't know you had the notes?

A. I don't know that.

Q. You didn't tell them you had the notes?

A. It likely came up in discussions but maybe not.

MR. TELAN: I'd like to get a copy of those, those notes, please.

MR. TUBIN: We'll evaluate whether they're discoverable, but I understand the request.

MR. TELAN: Now is probably a decent time for a five-minute break if you want to take a quick break.

VIDEOGRAPHER: We are now going off record. The time is 11:24.

(A recess was taken from 11:24 to 11:37.)

VIDEOGRAPHER: We are now back on record. The time is 11:37. You may continue.

A. So I just want to add to an earlier question. I was reminded during the break of two additional meetings that I had. One was with Dr. McCabe, and one was -- there was a group defense expert meeting with the lawyers. The meeting with

Dr. McCabe was also with the lawyers.
BY MR. TELAN:
Q. When was the meeting with Dr. McCabe?
A. It would be within the last couple of months. I think it was before my report, but I don't actually recall that.
Q. And you said there was one other that you were reminded of?
A. Both I was reminded of. The one with McCabe, I hadn't mentioned earlier. I only talked about Lipscomb and Goodman. And there was another one where several of us were on along with the lawyers.
Q. Are those reflected on your invoices?
A. They would be reflected as meeting.
Q. Can you look at your invoices? Do you see a meeting for October 31st of 2024?
A. October 31st.
Q. Nothing?
MR. TUBIN: Is there a specific page he should be looking at?
MR. TELAN: No. I just wanted him to look at the exhibit to see if he found a meeting for October 31st.
A. I don't see one here.

BY MR. TELAN:

Q. Let me hand you -- I'm going to mark this as the next numbered exhibit to the deposition, which I think is three.

(Exhibit 3 was marked for identification.)

BY MR. TELAN:

Q. If you go three pages in, this is Dr. Goodman's billing. Do you see about halfway down the page, not quite halfway down, an entry for October 31st, 2024, an hour and a half meeting with Dr. Shields, research?

A. I do see that.

Q. And you just confirmed that your invoice does not reflect that meeting, correct?

A. I don't see here any invoice reflecting October, so that is correct.

Q. So did the -- was there a meeting that took place on October 31st?

A. I'll have to say based on Dr. Goodman's invoice, likely.

Q. So was that an omission on your part?

MR. TUBIN: Objection to the form.

A. It either was an omission, which, again, it's just me, so things like that happen, or

there's a missing invoice from this.
BY MR. TELAN:
Q. There's a what?
A. Missing invoice from this. I can't tell you which it is.
Q. So we may not have a complete set of invoices?
A. It looks complete to me, but based on Dr. Goodman's record, assuming she didn't get it wrong, either I just forgot to bill it or there's a missing invoice.
Q. How do you keep track of your time in a case like this?
A. Sometimes it's a little yellow sticky note till it gets into QuickBooks. Other times, it goes right into QuickBooks. So if I had the meeting and moved on to something else, it's not uncommon, unfortunately, but I'll just forgot to put it in.
Q. So you think you forgot to put it in?
A. That's probably more likely, assuming that all the invoices are complete.
Q. Who would have been at that meeting?
A. All the meetings that I had with Dr. Goodman were with Dr. Goodman and other DOJ lawyers, except for that early meeting that I talked

about earlier where there was a number of different experts.

Q. Was there ever a meeting between just you and Dr. Goodman?

A. Without lawyers?

Q. With lawyers, just you and Dr. Goodman.

A. Yes, yes.

Q. I thought you said before that all of the meetings you'd had previously included multiple experts.

A. No, no, no. No, no, no. One meeting had multiple experts. I met with Dr. Goodman independently with the lawyers at least once, I think twice and maybe once with Dr. Lipscomb and her. As I said, I don't record these down, but there's -- and then another individual meeting with Dr. McCabe and the lawyers.

Q. And you said there was an agenda for each of those meetings?

MR. TUBIN: Objection to form.

A. I don't know what you mean by "agenda," but when I think of "agenda," I'm thinking like, you know, things that are mapped out, meeting agenda, you know, that sort of thing. I don't think it was that formal, but each meeting had a purpose.

BY MR. TELAN:

Q. And that purpose was made clear to you in advance of the meeting?

A. Yes.

Q. But whether or not a meeting took place with Dr. Goodman and the lawyers on October 31st, you're unable to say by recall, correct?

MR. TUBIN: Objection to form.

A. Right. I don't remember the dates for any of these meetings, and I would say there's a high probability that I forgot to record it rather than missing invoice.

BY MR. TELAN:

Q. Were you in town on October 31st, 2024?

A. So the answer is yes, and why I'm triply confused is because we always have a large Halloween party, and so I'm surprised that I even spent time on October 31st on this. We would really more than a hundred people over to our house for the party that I cook, so I'm prepping. So I'm surprised I had a meeting on October 31st, so maybe that's why I forgot to enter it into the invoices, because I was too busy with other stuff.

Q. Outside of your publications on smoking, have you published any scientific

peer-reviewed literature on any of the chemicals at issue in this case?

A. So benzene, yes. So that would be typically in the context of smoking-related exposures.

Q. I meant outside of smoking-related exposures.

A. Correct. I would have, you know, book chapters and things like that written about these exposures, but I can't recall offhand a peer-reviewed paper about them.

Q. You don't consider yourself a chemical expert on any -- strike that -- on TCE, do you?

A. I guess I don't know what that means as "a chemical expert."

Q. Your degree, was it in chemistry?

A. I have an undergraduate degree in biochemistry.

Q. Have you spent any time in your lab studying TCE?

A. Not that I recall.

Q. Have you spent any time in your lab studying PCE?

A. Not that I recall.

Q. What about DCE?

A. No.

Q. What about vinyl chloride?
A. Not that I recall.
Q. What about benzene specifically?
A. I guess I don't know what you mean by "benzene specifically." Benzene is a pure compound. The answer is no, but there's a lot of benzene in cigarette spoke, and so we've looked at a lot of damage related to benzene in the lung and the blood.
Q. But you testified before that there are dozens of carcinogenic compounds in cigarette smoke, correct?
MR. TUBIN: Objection to form.
A. Probably hundreds.
BY MR. TELAN:
Q. But your lab has never done any specific, benzene-specific research, correct?
A. Well, we've looked at benzene biomarkers, metabolites of benzene and the effects on the body.
Q. Okay. What chapters in books did you say that you had published relative to the compounds in this case outside of smoking?
A. So, I mean, I've had a lot of book chapters, but the one that comes to mind is I was always a co-author/lead author on the Davida textbooks

of oncology, where I've written a chapter in every edition until, like, 2014, or something like that, on the chemical causes of cancer sometimes disclose chemical etiology. And those chapters, for sure PCE and TCE, as well as benzene, would be discussed and probably vinyl chloride as well.

Q. You agree that all of the chemicals in the water at Camp Lejeune are carcinogenic chemicals?

MR. TUBIN: Objection to form.

A. In what context?

BY MR. TELAN:

Q. What do you mean "in what context"?

A. Are you talking in animals, in people?

Q. Either.

A. Well, so PCE is not a known human carcinogen for any cancer. TCE, arguably there are people who think that is a known carcinogen for kidney cancer. Benzene is a known carcinogen for AML. Vinyl chloride is a known carcinogen for angiosarcoma of the liver. DCE, I don't think is a -- I don't think. I know it's not been labeled as a carcinogen.

Q. You said TCE arguably is a cause of kidney cancer, you said?

A. Correct.

Q. And you would take the argument that it

is or is not a cause of kidney cancer?

A. So I don't think that the level of evidence for TCE causing cancer in humans, based on epidemiologic studies, rises to the level of sufficiency. I also recognize that there's a lot of learned, qualified academics in this world that do believe that the level of evidence rises to sufficiency.

Q. There are reasonable scientists and medical professionals who would disagree with you, correct?

MR. TUBIN: Objection to form.

A. In this case, that's correct, and we also know why we disagree in a very transparent and reproducible fashion. In fact, if you look at the IARC monograph for TCE from 2014 where they make the conclusion that TCE is a cause of kidney cancer, they point out that that was based on a majority vote.

A minority of the people on the committee did not believe that there was sufficient evidence, and that's all because it depends on how you weight the evidence. But it's clear how we're all weighing the evidence, and some people are weighing the evidence for control studies as being higher in weight than the cohort studies, which is sort of a

reverse epidemiology principle. And I understand why that is, but that's still not the more common epidemiologic applications for evaluation of these types of papers.

BY MR. TELAN:

Q. We'll get into the science of it more later, but since the IARC decision in 2014, the evidence for TCE in kidney cancer has gotten stronger over the last 11 years. True?

MR. TUBIN: Objection to form.

A. That's in my report. I don't agree with that.

BY MR. TELAN:

Q. Outside of your work as an expert in tobacco litigation, have you ever testified that a chemical has caused a plaintiff to develop cancer?

A. I've testified multiple times that an agent that was alleged to have alleged exposure can cause specific cancers, but other than one trial back in the 1980s, I haven't had had a case where the levels of exposure were sufficient to have caused the cancer in that individual, but I have testified that agents like diesel exhaust can cause lung cancer, and benzene can cause AML. Those are two that I can think of offhand.

Q. I'm talking specifically about a particular plaintiff. Have you ever testified in a plaintiff, in a plaintiff's case that a particular exposure to a chemical caused that person to develop cancer?

MR. TUBIN: Objection to form.

A. So you're saying "chemical." I had an asbestos mesothelioma case, which technically is not a cancer, is not a chemical, where I said that was specific causation. As I just said, in the cases that I can recall that I routinely do, when there is sufficient evidence for the exposure causing a cancer, then the question is whether the level of exposure was sufficient for the individual, and I don't recall anywhere that was the case. The exposures don't rise to levels for sufficiency of causing that cancer.

BY MR. TELAN:

Q. And the asbestos case, the mesothelioma case that you mentioned, was that in the 1980s?

A. I believe it was in the 1980s.

Q. How many depositions have you given in your career as an expert?

A. I don't even know how to estimate that. Some years, it's a lot. Some years, it was less. Since I really started doing the litigation work in

the 2000s, it was increasing over time, so I really don't have an estimate for you. You can't take, for example, the trial list now for the last four years and multiply it by three or four, because in previous years, it would be a lot less than what was there.

Q. There are 55 in the last four years, right?

A. I don't know the number offhand, but if you want to represent that, I'll accept that.

Q. Does that sound about right?

A. It sounds high, but it went on to a second page.

Q. So you would have started doing expert work in the 1980s, which would have been shortly after you started practicing?

MR. TUBIN: Objection to form.

A. So there was a year between my residency and fellowship that I was working in an occupational medicine practice, which is a typical occupational medicine practice, but it also included litigation. I did testify in a trial then.

I also gave a deposition in a TCE case back then, and then when I went to work for the National Cancer Institute, I stopped all of that type of work, with the exception of helping a guy named

Ken Chase with his occupational medicine practice that included litigation. When I came out of the government somewhere just after 2000, this slowly started increasing in terms of my expert witness consulting.

BY MR. TELAN:

Q. Do you think that you've testified in excess of a hundred times in deposition as an expert?

MR. TUBIN: Objection to form.

A. Probably.

BY MR. TELAN:

Q. Do you think it's more than 200?

MR. TUBIN: Objection to form.

A. That sounds really high. I doubt it, but I guess it's possible.

BY MR. TELAN:

Q. Outside of your cases as an expert on smoking, what percentage of the time are you working with plaintiffs as opposed to industry?

MR. TUBIN: Objection to form.

A. Almost all of my plaintiffs' work would be smoking related, including the U.S. Attorneys General in class action suits. I think separate from the smoking-related work, it would be primarily or almost entirely defense.

BY MR. TELAN:

Q. And over the years, you've worked with a number of railroads, correct?

MR. TUBIN: Objection to form.

A. Correct.

BY MR. TELAN:

Q. You've worked with Monsanto?

A. Correct.

Q. Have you worked with ExxonMobil?

A. Yes.

Q. How about GE?

A. GE, I've had a couple cases for them back in the 2000s.

Q. How about Shell?

A. I don't recall that, but some of these cases have multiple defendants, and so it's possible, but I don't recall specifically Shell.

Q. At its highest, I know you've earned multiples of millions as an expert over your career, correct?

MR. TUBIN: Objection.

A. Over 25 years, yes.

BY MR. TELAN:

Q. And at times, it was in excess of $600,000 a year, correct?

A. In some years, correct.
Q. When was the last time you gave a deposition?
A. I think within the last -- definitely within the last two months.
Q. And what was the case?
A. I don't -- I don't remember.
Q. You don't remember who it was for?
MR. TUBIN: Objection to form.
A. No, I don't. If it's on my case list, it might help if you want to look at that.
BY MR. TELAN:
Q. Have you ever testified in a case involving kidney cancer before?
A. Yes.
Q. When was the last time?
A. I can't tell you the last time. In these railroad cases, that's a pretty regular thing. I also have a current benzene case with alleged exposure of benzene from mineral spirits. That's a kidney cancer case, so that's kind of the regular.
Q. Is that Safety-Kleen or is that a different company?
A. It's a Safety-Kleen case.
Q. How many times have you worked with

Safety-Kleen?

A. Over the 25 years, I'm thinking about a dozen times.

Q. Have you -- have you done any cases as an expert involving bladder cancer?

A. Yes.

Q. And when was the last time?

A. That's also --

Q. Safety-Kleen?

A. Not Safety-Kleen but pretty regular with the railroad.

Q. Westinghouse is another company you've done work with?

A. I think I've done Westinghouse many, many, many years ago, but not recently.

Q. You've published before that Bradford Hill is not to be considered criteria, correct?

MR. TUBIN: Objection to form.

A. I don't believe that's correct. If you have something to show me, that would be helpful.

BY MR. TELAN:

Q. Do you remember testifying to that?

A. I'm trying to make sure that you're not getting confused. Bradford Hill is widely used. It's not perfect, but it's as good as it gets. There are

other methodologies. So if I testified, I would have testified saying exactly that, but I regularly use Bradford Hill, and I have published in the peer-review literature papers that have applied to Bradford Hill.

Q. You don't consider them to be criteria. You call them considerations, correct?

MR. TUBIN: Objection to form.

A. So I actually call them criteria. This is something that's -- I at least found interesting, because it's usually plaintiffs' firms that want to call them factors. Sometimes people call them considerations on both sides. Sometimes they're criteria. Those words are all the same to me. I mean, the Bradford Hill, I would use criteria, are all the same, and those words are not a distinguishing feature.

Q. If you've made a distinction, is there a reason why you would have drawn a distinction between criteria and consideration?

A. No. And as I said, a lot of times, they want to call them factors. And, to me, it's all the same. If you're applying consistency, you're applying consistency whether it's a consideration, a factor or a criteria.

Q. How long have you been serving as an

expert for chemical manufacturers?

MR. TUBIN: Objection to form.

A. Well, so there was the one case in the 1980s and then sometime -- I'm sorry. Did you say "chemical manufacturers"?

BY MR. TELAN:

Q. Yes.

A. Okay. So that's a different question. Because I have to understand what the question is, I mean, the only chemical manufacturer that I think I've done work for would be Monsanto. I don't know if you're distinguishing something like that. For example, Safety-Kleen, which is really a supplier, or carburetor cleaners like Berryman, which would be a supplier. So chemical manufacturers, the only one I can think of is really Monsanto.

Q. Monsanto is a chemical manufacturer, correct?

A. Correct.

Q. They manufacture benzene, correct?

MR. TUBIN: Objection to form.

A. I don't know that either way.

(Exhibit 4 was marked for identification.)

BY MR. TELAN:

Q. I'm going to mark the next exhibit, just take a second here to pull this up.

In terms of Bradford Hill do you recall -- do you recall -- I'll show it to you in a minute -- publishing a paper titled "Understanding Population and Individual Risk Assessment: The Case of Polychlorinated Biphenyls"?

A. Yes.

Q. You do recall that paper?

A. Correct.

Q. Do you recall, under the cancer causation section of that paper, stating, "Published guidelines exist per assessing causality, such as those proposed by Sir Bradford Hill. It should be noted that although Bradford Hill's statements are usually called criteria, Bradford Hill himself called them viewpoints."

A. Okay.

Q. Do you recall that?

A. I don't recall. I can see the paper, but that sounds like something that's correct.

Q. So why did you draw a distinction between viewpoints and criteria?

A. Well, because Bradford Hill wrote this

in the 1960s, and that was 1960s epidemiology and causation. How it's used today in 2025 or, when this was published, as an editorial in 2006, has evolved.

Q. And why did Bradford Hill come up with these?

MR. TUBIN: Objection to form.

A. So that's an interesting story because --

BY MR. TELAN:

Q. Give me the Cliffs Notes version.

A. Yeah. I'm trying to. So a lot of people think he didn't and that he basically was copying that from the first Surgeon General's report about smoking and health showing that lung cancer is caused by smoking in males where they actually used exactly the same framework.

And then Bradford Hill at some convention gives a speech that gets recorded this way, and then the end story of the CliffsNotes is that people call Bradford Hill criteria or criterion or factors or viewpoints or considerations when, in fact, it was first done by the Office of Smoking and Health of the CDC.

Q. And do you agree that these are not to be considered as rigid criteria in evaluating

causality?

A. That depends.

Q. On what?

A. On the robustness of the data that's available.

Q. Do you agree that there's no consensus in the scientific community as to how to apply these viewpoints?

A. I totally disagree with that.

Q. In terms of -- and maybe you answered this already. Let me get back to it, though.

Why did you draw a distinction between criteria and consideration --

MR. TUBIN: Objection to form.

BY MR. TELAN:

Q. -- in this article?

A. So it's not criteria and consideration. It's criteria and viewpoints.

Q. Viewpoints. Okay.

A. Because as I just said, back in the 1960s, this was an evolving process in cancer causation. As we evolved 35, 40 years later, it's more than just viewpoints. This is well accepted application of cancer causation methodology using a weight-of-evidence process.

Q. Didn't you say it's not the only way to evaluate causation?

A. There are others.

Q. Okay.

A. This is the one that virtually all the regulatory and review agencies use is Bradford Hill. I think in my report, there's other frameworks that have been published, just never held. There is, among the risk assessment toxicology people, something called a mode-of-action analysis, which also is used, but that's really a different process for causation.

Q. Certainly, over the past 60 years, biological plausibility has grown in importance relative to it was when Bradford Hill announced the Bradford Hill considerations. True?

MR. TUBIN: Objection to form.

A. Well, we certainly have a lot of research and understandings of the carcinogenic process, so I think that that's true.

BY MR. TELAN:

Q. Do you consider biological plausibility as a means to inform epidemiological evaluation of causation or do you consider it an independent line of analysis for causation?

MR. TUBIN: Objection to form.

A. So it depends on the context. When I design an epidemiologic study, as a molecular epidemiologist, I'm thinking about the biological basis for associations, and I try to test that.

So, for example, I'm not just looking at exposure causing some effect. I want some biomarker to show that there's a level of exposure and there's a level of effect. So in that case, biological knowledge is informing the epidemiologic research study.

In the other context, as we're sitting here today, where causation criteria is there, biological plausibility is an important part of the process if and when you have sufficient human evidence measured by consistency, strength of association, dose response. Even if you have those, they still could have problems with confounding and bias, so you look to biological plausibility as well as the other criteria to help support why you're seeing what you're seeing in the human evidence.

BY MR. TELAN:

Q. Have you been involved in a research project for where biological evidence has answered the question of causation in advance of human epidemiological evidence?

MR. TUBIN: Objection to form.

A. I'm not sure I understand the question, but I think the answer is no.

BY MR. TELAN:

Q. Okay. Getting back to the Camp Lejeune Justice Act, were you provided with a copy of the ATSDR 2017?

A. Which ATSDR 2017?

Q. The assessment of the evidence.

A. So I don't know whether I was -- I don't think I was provided with it. I probably got it on my own.

Q. Is that listed in your documents reviewed or materials considered?

A. Yes. It's in the reference list.

Q. Let me -- and do you know what the Agency for Toxic Substances and Disease Registry does, what their mission is?

A. Generally, their focus is on environmental contaminations, more so to track what exposures are and any potential toxic effects.

Q. They're an agency of the United States Government. True?

A. Yeah. I think the Centers for Disease Control.

Q. And you know that Frank Bove, the author of the ATSDR studies that we talked about, at the time was the senior epidemiologist for the ATSDR. True?

A. I don't know what his title was, but he was an epidemiologist for the ATSDR.

Q. Did you know him before you came to this case?

A. No.

MR. TUBIN: Objection to form.

BY MR. TELAN:

Q. Did you know Julie Goodman before you came to this case?

MR. TUBIN: Objection to form.

A. As I mentioned earlier, Julie actually reminded me that she did her fellowship in the same lab where I was one of the researchers, so she remembered. I actually didn't remember that. I don't think I've ever published with her or did any research projects with her.

BY MR. TELAN:

Q. Do you consider yourself an expert in Parkinson's disease?

A. No. As an internist, I understand Parkinson's disease, but for the purposes that we sit

here today, the answer is no in terms of causation and epidemiology.

Q. You've never practiced as a general internist, have you?

A. I have.

Q. When was the last time you practiced as a general internist?

A. That would be when I finished my residency and fellowship.

Q. What year was that?

A. '83, '87.

Q. Have you ever diagnosed Parkinson's disease?

A. I probably did back then but not since then.

Q. What are the elements of Parkinson's disease?

A. What do you mean by "elements"?

Q. The three characteristics of Parkinson's disease, diagnostic criteria.

A. Oh, I have no idea.

Q. Why were you sent the Parkinson's disease materials in this case?

A. I can't tell you. I haven't really looked at them or relied upon them in any way.

Q. Aren't they listed in your materials-considered list?

A. Correct.

Q. What did you review them for?

A. I don't even remember. I probably opened them and looked at them more out of curiosity, but it doesn't really contribute to my opinions in this case.

Q. Did you intend at any point on testifying about Parkinson's disease?

A. No.

Q. Did you ask to receive those materials?

A. No.

Q. But you reviewed them?

A. For the Parkinson's reports, it would literally be opened and closed. What I was providing you was a list of documents that I have received and reviewed in some way.

Q. And you received and reviewed a number of documents relative to Parkinson's disease, including reports, correct?

MR. TUBIN: Objection to form.

A. I think the only one was the one by Julie Goodman.

BY MR. TELAN:

Q. And what benefit was that to you in this case?

A. There was no benefit.

Q. Is Julie Goodman an expert in Parkinson's disease?

MR. TUBIN: Objection to form.

A. I don't know that either way.

BY MR. TELAN:

Q. By the way, Gradient has not made you any job offers, have they?

A. No.

Q. As professor emeritus at Ohio State, do you still have a responsibility to admit or does that go away once you get the designation of emeritus?

A. So I've never had admitting privileges, because I decided I didn't want to care as a major time commitment. It would not have gone away as emeritus had I done that. But when I went to Ohio State, I made the conscious decision that I was not going to be spending one to two months a year full time taking care of hospital patients.

Q. The ATSDR assessment of the evidence, it's a long document, but I presume you've seen the section of that document called "Classification of

Evidence"?

A. Yes.

Q. Do you recall it as you sit here today?

A. It depends on your level of questions. It's certainly quite extensively reviewed in my report.

Q. Give me your understanding, as you sit here today, as to the classifications of evidence outlined in the 2017 ATSDR.

A. So they're efficient. Then there's this concept of equipoise and more likely than not, and then there's a lower one, which is neither of those.

Q. You've heard the term "sufficient" before, correct?

A. Yes.

Q. Have you heard the term "more likely than not" in scientific circles before?

A. I will tell you that I don't recall ever doing that. I mentioned before, you do a PubMed search, you won't find an article among the national database of probably 60 million papers. Just put it in quotes, and it will say "no results found."

I've never seen it in a justification for a grant application. I've never seen it in a

publication. That's just not a term that has meaning within the medical and scientific community. In my experience, that's a legal concept that we talked about before.

For it to be more likely than not, as you know, sufficient evidence for us to decide how to treat a patient or for causation or for a cancer screening is based on robust studies with 95 percent confidence intervals, not, for example, a 50 percent confidence interval.

Q. So when you read the classification of evidence that the ATSDR outlined in its report of 2017, is it fair to say that you just disregarded that?

MR. TUBIN: Objection to form.

A. No. I considered it heavily, and it's also fair to say that that was one person's view at ATSDR. ATSDR had never used it before, and ATSDR has not, as far as I could find, ever used it again. So that was Dr. Bove doing some work under the direction of the Veteran's Administration.

BY MR. TELAN:

Q. If you were to consider analyzing causality in the framework that the ATSDR proposed, using the terminology at least as likely as not, would

your analysis have been any different than the one you performed in this case?

MR. TUBIN: Objection to form.

A. I guess I don't know how to answer that, because more likely than not, it's just something that doesn't have meaning. That implies some quantitative analysis of the literature that doesn't work. I mean, it's not a concept, as I said, that's ever been used otherwise by ATSDR or EPA or IARC or NTP.

Dr. Bove said he got it from an IOM document about presumptive disability for veterans, and then he deviated substantially from that. And then actually, subsequently, the IOM has had documents that not only abandoned that concept but actually said that equipoise is a concept that reflects controversy and lack of consensus, and that's all in my report.

MR. TUBIN: We're talking about equipoise, not more likely than not? Is that --

MR. TELAN: Marc, please. This is not -- if he has any questions, he can ask me, but that's not even a speaking objection. That's just speaking, and I think that's stepping over.

MR. TUBIN: It wasn't clear to me in the question.

MR. TELAN: I get it, but if he has any questions, he's an intelligent man. He'll ask me if he doesn't understand something.

A. So to be clear, I use those interchangeably, equipoise, or the way Dr. Bove was using it, more likely than not. Some people have, like your plaintiffs' experts, have transitioned that into as likely as not.

BY MR. TELAN:

Q. The term "equipoise" is a term that you understand, correct?

A. I understand it not -- well, I understand it generally. Where it's used in medicine is not for this type of purpose but is an ethical justification to do clinical trials, meaning that there is uncertainty for whether, for example, a medicine works or not, and so that justifies giving a patient the medicine. And that's the way it is used. And whenever I've heard it in that context until this, until this case, I've never heard it used in the context of cancer causation other than by Dr. Bove in his six-week development of the assessment of evidence.

Q. When you've heard in clinical trials that the evidence is an equipoise, does that mean to you that the evidence is equally balanced?

A. I guess I haven't seen that. My understanding is just that it's uncertain. It lacks consensus. Consensus doesn't always mean equally balanced, but what it does is it gives you the ethical justification to do experiments in people.

Q. Is there a consensus among epidemiologists on how to speak about statistical significance?

A. I'm trying to figure out how to answer that question, because I'm anticipating the context of where you're going.

Q. We'll get there.

A. So there's no -- there's an absolute consensus that statistical analysis is critical, and in one way or another, you're assessing for chance findings. Whether you use P values or not, there's some controversy. There is more of a consensus to use things like confidence intervals and understanding the robustness of your statistical significance.

Depending on who you are, you may define statistical significance as a P value only, and they say, well, therefore, statistical significance

testing should not be done. Other folks like myself, when I call and talk about statistical significance testing, I'm including any analysis that's looking at chance findings. So that could be regression analysis, resulting in confidence intervals or other type of modeling.

Q. Do you understand that there is a disagreement between epidemiologists over whether or not statistical significance should be used to dichotomize the results of the study as either statistically significant or not statistically significant?

A. So if you're talking about a P value of .05 being statistically significant, it's still widely used.

Q. What about a confidence interval?

A. Let me finish.

MR. TUBIN: He's not done answering.

A. It's still -- it's still widely used, but there is some concern about statistical significance or not. If you're using confidence intervals, it still is appropriate to say that if something includes confidence intervals below and above one, that you lack statistical significance. It doesn't support your hypothesis. Ultimately, that

still is a dichotomous conclusion, but it's not interpreted as, you know, being pregnant or not pregnant.

Q. Do you understand -- and I'm talking about confidence intervals now, not values -- that there is a large group of epidemiologists who believe that it is not appropriate to dichotomize results using confidence intervals that include the null value?

MR. TUBIN: Objection. Foundation.

A. So I will totally disagree with that, and I will refer to you the sections in my report. High-impact journals, like New England Journal of Medicine, the American Statistical Association still regularly refer to and require confidence interval testing. And, yes, you could say there is a continuum of risk, but at the end of the day, when you don't have statistical significance when that confidence interval at the lower end drops below one, you cannot say that, gee, this is still in support of my hypothesis. It may be, but it also is maybe not.

So, conventionally, for all the high-powered journals, grants that I review, grants that I write, that confidence interval, for you to call it statistically significant, has to be

statistically either above one or, in some cases, below one, depending on what you're talking about.
BY MR. TELAN:
Q. Have you read the rebuttal report from David Savitz?
A. I have.
Q. Do you disagree with his phraseology or his opinions relative to statistical significance?
MR. TUBIN: Objection to form.
A. No. But I think your understanding and your experts' understanding is not that of what Dr. Savitz is trying to say.
BY MR. TELAN:
Q. When you testified as an expert for plaintiffs in the tobacco cases, you came to learn about the tobacco industry, did you not?
MR. TUBIN: Objection to form.
A. I'm trying to understand. I mean, if you're asking me did I not know about the tobacco industry until I was retained, of course, I was well aware of the tobacco industry and their internal documents. So I guess the answer is no. I had a deep understanding prior to being retained in those cases.
BY MR. TELAN:
Q. But as you became retained in those

cases, you became more familiar not only with their internal documents but their attempts to influence science, correct?

MR. TUBIN: Objection to form.

A. Sure.

BY MR. TELAN:

Q. And there was a rather noteworthy case, the Giancopolus case that you were involved in with Phillip Morris. Do you recall that?

A. That name is not familiar. Was that a state class action?

Q. It's out of Boston. It was a case involving the light cigarettes. Do you remember that now?

A. Now I do, yeah.

Q. Okay. And you testified that there was a consensus at that time that the light cigarettes were not health promoting as the tobacco industry was suggesting, correct?

MR. TUBIN: Objection to form.

A. The consensus at the time of my testimony?

BY MR. TELAN:

Q. Yes.

A. Yes, that's correct.

Q. It was during that case that you came across Dr. Goodman's boss, Peter Valberg, correct?

MR. TUBIN: Objection to form.

A. I actually think he was in cases earlier than that. He's a regular Phillip Morris expert, and what I just learned was that he was Dr. Goodman's boss. I did not know that before.

BY MR. TELAN:

Q. You read his deposition testimony in that case, right?

A. I'm sure I did.

Q. Do you remember him saying that he and Dr. Goodman worked together on the research that formed the basis for his opinions?

MR. TUBIN: Objection to form.

A. I don't recall that.

BY MR. TELAN:

Q. You recall his testimony, though, right?

A. I recall him being in the case. And I recall generally what he was saying, which was rebutting what I was saying, but I don't really have much more of a recollection than that.

Q. And what he said was something that you vehemently disagreed with, correct?

MR. TUBIN: Objection to form.

A. You'd have to show me what you're talking about.

BY MR. TELAN:

Q. Do you remember him testifying that the cigarette modifications that were made were health promoting?

MR. TUBIN: Objection to form.

A. I don't remember that either way.

BY MR. TELAN:

Q. Do you remember giving any interviews calling Dr. Valberg out as being inconsistent with the consensus of science?

A. I don't remember an interview, but my recollection is that his views were inconsistent with what the consensus was and a large amount of data showing that, at best, the filter ventilation modification to cigarettes leading to something that the industry called light cigarettes were certainly not health promoting and, in fact, were more likely to be harmful using a Bradford Hill analysis, which I published in the peer-review literature in the Journal of the National Cancer Institute.

Q. And you know that Phillip Morris had actually done their own scientific research and

published studies that were contrary to what you testified to, correct?

MR. TUBIN: Objection to form.

A. So I don't think that's correct. In fact, I use their published studies very much against what they knew and what they didn't publish until, you know, the late 1990s and early 2000s, but they were sitting on data going back to the 1960s that they never published, but I extensively use their papers to show that the addition of filter ventilation provided no health benefit to smokers switching to light cigarettes.

BY MR. TELAN:

Q. So what you disagree -- you disagree with Dr. Valberg's interpretation of the data, correct? You and he had the same data from Phillip Morris?

A. Well, I was agreeing with what Phillip Morris was publishing, and Dr. Valberg had his own opinions.

Q. Is that the first time that you had run into anyone from Gradient in that Phillip Morris case?

MR. TUBIN: Objection to form.

A. I don't know. I mean, I don't even remember Dr. Valberg, if he was at Gradient at the

time or not. I don't recall that. I don't generally track or recall when people work for different companies.

BY MR. TELAN:

Q. You've never been to Gradient?

A. No.

Q. Did you meet Dr. Goodman in connection with the Phillip Morris case, do you recall now, or no?

A. Highly unlikely.

Q. Do you recall publishing an article called "Tobacco Industry Abuse of the Substantial Equivalence Pathway, the Case of Changing Cigarette Filter Ventilation"?

A. Sounds like something. Who is the first author?

Q. Michael Berman -- Mica Berman.

A. Yes.

Q. And you recall that article, essentially, the way I understand it is using the existing FDA regulations to their advantage so as not to have to comply with more stringent product modification regulations that existed?

MR. TUBIN: Objection to form.

BY MR. TELAN:

Q. Correct?

A. That doesn't sound correct. If you want, I can explain the paper.

Q. We'll get to that in a minute here. He's doing something else.

Suffice it to say that the information you gained about the tobacco industry during the course of your work as an expert led you to question the tactics of that industry in its effort to avoid regulations, correct?

MR. TUBIN: Objection to form.

A. Maybe say the question again, because I didn't follow it.

BY MR. TELAN:

Q. Sure. The information that you gained as an expert in the tobacco litigation led you to question some of the tactics the tobacco industry took in an effort to avoid regulations, correct?

MR. TUBIN: Objection to form.

A. I guess -- I've got 30-plus years of research in the tobacco arena. It depends on what you're talking about, and the paper that you're holding that is not correct, that was part of our own research where we realized how at least Phillip Morris

was still gaming the system using the substantial equivalence in not needing to get FDA Center for Tobacco Products' approval for marketing products by gaming the substantial equivalence issue, and what we were doing was telling researchers when you go to buy a commercial cigarette, you can't assume it is what it is, because at least Phillip Morris was regularly changing the designs, in some cases we thought to actually mess up one of our large studies funded by the National Cancer Institute.

BY MR. TELAN:

Q. And that's what you meant when you said "gaming the system"?

A. Correct. So under the law, as long as the cigarette is within some parameters of all the products on the market, they can do whatever they want. And so they were sort of moving to get people more addicted by changing the filter ventilation, which they were allowed to do without disclosing that to anyone, although in certain cases online, you would see, you know, reports by smokers saying, hey, these things don't taste the same, and that was one way that we realized that Phillips Morris was changing the products that were within the law, but they were gaming the system to still manipulate smokers and

their addiction.

Q. I'm going to hand you an article now from Dr. Goodman. The title of it is "Weight-of-evidence evaluation of short-term ozone exposure and cardiovascular effects." And we'll mark this as number 4 to the --

MR. TUBIN: It's five.

MR. TELAN: Is that number 5? Oh, sorry.

MR. TUBIN: Don't worry about it.

MR. TELAN: Yeah, I know.

(Exhibit 5 was marked for identification.)

BY MR. TELAN:

Q. Have you ever seen this article before?

A. I don't believe so.

Q. Okay. If you would, take a look at page -- it's the first page with the abstract.

A. Okay.

Q. If you go down to the bottom line, "Thus, we categorize the strength of evidence for a causal relationship between short-term exposures to ozone and CV effects as 'below equipoise.'" Do you see that?

A. Yes.

Q. You've never seen that before in a scientific article?

A. I have not. I did not do a PubMed search on the word "equipoise." Just more likely than not, as likely is not.

Q. Okay.

A. The equipoise thing I can tell you is not something whether or not Dr. Goodman has published it here or whatever context that she and her co-authors were doing. That's not part of, you know, regular causation-accepted practice, analysis never seen in IARC, never seen in EPA, never seen it in NTP. Other than Dr. Bove's assessment, I've never seen it in ATSDR, and as I mentioned, the IOM, who originally proposed this in the context of veterans' presumptive disability, walked away from it and actually said that it was not. It only reflected uncertainty.

Q. Understood. So outside of Dr. Bove's article, this is now only the second time you would have seen use of that language, correct?

A. That is correct. And I'm not sure. I think it looks like she's referring to something else that might have referred to --

Q. Let's go to page 729.

MR. TUBIN: Hold on. He's still giving

an answer. Were you done, Dr. Shields?

A. Yeah. I don't know the context of what is being used. I'd have to review the paper to understand that context.

BY MR. TELAN:

Q. Okay. I think we'll get that here. If you go to page 729, if you go down to the bottom, last paragraph before the bolded Phase 1 explanation of the causal questions and study selection, starting with in Phase 4. Do you see that? It's on page 729.

A. I'm on 729.

Q. Bottom left, first full paragraph, "In Phase 4, we used the WoE," weight of evidence, "conclusions from Phase 3 to categorize the potential causal relationship between short-term ozone exposure and CV effects." Do you see that?

A. Yes.

Q. "We relied on the categories of causal determination proposed in the Institute of Medicine (IOM) report Improving the Presumptive Disability Decision-making Process for Veterans (hereafter, the IOM framework) (IOM 2008), on which the NAAQS causal framework is based."

Did I read that correctly?

A. Yes.

Q. "The IOM framework has four categories of causal determination: 'Sufficient,' 'Equipoise and above,' 'Below equipoise' and 'Against.' Use of this four-level categorization scheme is consistent with WoE best practices." And she cites to another article she wrote in 2013.

Do you see that?

A. Yes.

Q. "We contrasted our conclusions with those from the ISA and assessed how the differences between the NAAQS causal framework and Goodman WoE framework affected the conclusions."

Did I read that correctly?

A. Yes.

Q. Okay. So does that give you a little further insight into the fact that Dr. Goodman was comfortable writing this as a scientific causality evaluation using that framework?

A. As of 2014, when this paper was published, again, I'd have to go through the paper to see whether I can agree with you or not, but I note that the IOM in 2015, in 2022, both in my report, walked away from the whole concept of equipoise or equipoise and above.

Q. So would you say that Dr. Goodman was,

was using a novel scientific approach here in her, her discussion of ozone and its causal effects on cardiovascular effects?

A. I don't know. Either way, I'd have to go back to Goodman's 2013. If you have that paper, we can review that to see what she was categorizing there as best practices.

THE WITNESS: I don't know if we're getting closer to break time or not.

MR. TUBIN: We've been going about an hour since the last break.

MR. TELAN: All right. Let's take five, then.

MR. TUBIN: When do you want to stop for lunch?

MS. SPRAYREGEN: Can we go off the record?

VIDEOGRAPHER: We are now going off record. The time is 12:36.

(A recess was taken from 12:36 to 12:37.)

VIDEOGRAPHER: We are now back on the record. The time is 12:37. You may continue.

BY MR. TELAN:

Q. Dr. Shields, in terms of your view of

IARC and its categorization of the evidence of causality as it relates to benzene and leukemia, are you in agreement or disagreement with IARC?

A. Well, let's be clear. There's lots of types of leukemias. IARC evaluates the types of leukemias. I am in agreement that benzene, at sufficient levels of exposure, is a cause of acute myeloid leukemia, AML. And I'll note that they also believe there's credible associations, which is the same as insufficient human evidence for several of the other hematologic malignancies.

Q. What about as to IHL? What is your understanding as to IARC's classification of the evidence as to benzene and NHL?

A. Again, that's what I said, other hematologic malignancies. So they said that there are associations, but it doesn't reach the level of sufficient human evidence, so they would call that limited evidence.

Q. And are you in agreement with that?

A. I don't have a reason to disagree. There are some decent quality studies that are, have positive statistical associations, but the bulk of the literature, the consistency, the dose response, the strength of associations, assessments don't reach the

level of sufficient human evidence.

Q. So you agree with their categorization of it as being limited?

MR. TUBIN: Objection to form.

A. At the most. I mean, one of the problems with that monograph is they don't really specifically state which study they decide is the credible association. All they say is that they can't rule out chance, bias and confounding, and that for sure I agree with.

BY MR. TELAN:

Q. So where do you stand? Are you in agreement with it or disagreement with it?

MR. TUBIN: Objection to form.

A. I don't agree or disagree. I don't have a problem with their conclusion.

BY MR. TELAN:

Q. Okay. What about as to TCE and cancer?

MR. TUBIN: Objection to form.

A. And any cancer?

BY MR. TELAN:

Q. Any cancer.

A. Well, so IARC has said there is sufficient human evidence for TCE and kidney cancer based on a majority vote of the working group.

Q. You're in agreement with that?
A. No. In that case, I understand why those people who voted affirmatively, and I understand why others did not vote affirmatively. And I think, based on their analysis, I don't agree that it's a cause of kidney cancer, but I recognize that there's evidence for folks to be able to say that there is. It's transparent. It's clear. They make a very strong statement about why there -- why some of those folks are voting against the sufficient human evidence for kidney cancer.
Q. How many people are on the panel who voted in favor of sufficiency in 2014?
A. It just says a majority.
Q. I'm asking how many were on the panel.
A. I'd have to open up the documents.
Q. Do you know?
A. I definitely do not know how many people were on a working group in 2014.
Q. Do you know how many people voted against the categorization of sufficient?
A. It says a minority.
Q. Do you know numbers-wise how many that was, if it was one or more?
A. No. I would look at it as just below

50 percent, as I understand that process, but they don't publish that.

Q. Have you talked to anybody who is on that panel?

MR. TUBIN: Objection to form.

A. I'd have to see who's on the panel to be able to answer that question. If you want, I can open it up.

BY MR. TELAN:

Q. As you sit here today, nothing comes to mind that you've had conversations with one of the IARC members who were on the 2014 panel that evaluated the carcinogenicity of TCE?

A. So there's a good chance I know at least some of them. So are you asking me whether I talked to them about the TCE working group?

Q. Yes, yes.

A. Okay. So I don't recall any.

Q. I'm going to hand you another article we'll mark as the next numbered Exhibit 6.

(Exhibit 6 was marked for identification.)

BY MR. TELAN:

Q. This is another article from Dr. Goodman. Do you see that?

A. Yes.
Q. And this now is 2017, correct?
A. It's 2018.
Q. 2018. You said that the IOM walked away from its categorization from the prior article we were discussing. Do you recall that?
A. Yes.
Q. If you take a look at the abstract, the first page, the last sentence, "Taken together, the weight of evidence indicates that there is at least an equal likelihood that either explanation is true, i.e., the strength of the evidence for a causal relationship between short-term exposure to ambient ozone concentrations and asthma severity is equipoise and above."
Did I read that correctly?
A. Yes.
Q. So this is now a second article that Dr. Goodman has published using the language you say you've never seen before other than Bove, correct?
A. That's correct.
Q. Was she acting contrary to the consensus of science in 2017 when she published this?
MR. TUBIN: Objection to form.
A. What I said is as of 2015, the IOM

walked away from it. She hasn't seen to cite that or discuss that.

BY MR. TELAN:

Q. So was she acting against the consensus of science when she wrote this two years after the IOM walked away from this?

MR. TUBIN: Objection to form.

A. You keep talking about consensus of science. There's no consensus of science to be using equipoise or equipoise and above that I know of. What I'm saying is that she's looking at the process for presumptive disability decision-making for veterans, which is a very unique circumstance and very far out of the realm of what we're talking about today. She's not citing the 2015. And so what I could say is she's not citing the 2015 and including that in this paper.

BY MR. TELAN:

Q. If you look toward the bottom of page 392, far-right column, there's a paragraph starting with "We integrated the evidence." Do you see that?

A. Yes, I see that now.

Q. Second sentence in, she says, "We integrated the evidence across these realms in the context of several of the Bradford Hill aspects, including" -- and she goes on to name the aspects --

"as well as confounding, bias and the clinical relevance of effects." Do you see that sentence?

A. Yes.

Q. She did not use the term "criteria" or "considerations" in that but used the term "aspect," correct?

A. Or viewpoints or factors. That's correct.

Q. She then goes on to say, "We did this to determine whether the collective evidence indicates that the short-term exposure to ambient ozone concentrations can affect asthma disease severity. Our causal determination is based on the categorization of the strength of the overall evidence across all realms for or against a causal relationship proposed by the Institute of Medicine 2008." She goes on to list the four categories.

MR. TELAN: There is an alarm, I think. Let's go off the record.

VIDEOGRAPHER: We're now going off record. The time is 12:46.

(Off the record.)

VIDEOGRAPHER: We are now back on the record. The time is 12:47.

BY MR. TELAN:

Q. So I think where we left off, I read into the record that last sentence.

Did I read that correctly?

A. Yes.

Q. And you see, just from this article, this is not an article judging military disability. This is an article judging the effects of ozone exposure on asthma, correct?

A. Well, she's using a process that was developed for presumptive disability.

Q. Yes, but not in the context of judging military veteran disability?

A. I don't know if that's true or not, and I would think that if she's using that criteria, then that's what she's doing.

Q. Let's say if you look at methods, under "Methods," we addressed the question, "Does short-term exposure to ozone at ambient concentrations affect asthma severity?"

Is there anything to indicate that she's addressing a precise population of military veterans?

A. I don't think you can say that yes or no. She's using a criteria for presumptive disability

from the Institute of Medicine, 2008.

Q. Okay. Assume that it's not for the use, that this article is not addressing ozone and asthma severity in the military population specifically. Is she using this framework in a novel fashion?

A. I'm going to have to take a few minutes to review this paper to be able to answer your question.

Q. I'm asking it hypothetically so that you don't.

A. I can't answer that hypothetically.

Q. Why can't you answer it hypothetically?

A. Because you're asking me to make an opinion about this paper, which I can't read. For all I know, it is entirely about U.S. veterans. She's using a methodology for -- let me finish -- for presumptive disability. There must be a reason why, and I guess you could ask her why.

And I note that she's using the 2008 criteria for presumptive disability; whereas, 2015, they went to a different presumptive disability process, and you'd have to ask her why she didn't use the 2015 in this paper.

But they specifically, in 2015,

re-evaluated the process, abandoned this concept of equipoise and went to something that is more conventional in terms of sufficient limited, that sort of thing. So they aligned themselves with EPA and IARC and NTP.

Q. So hypothetically, then, if Dr. Goodman's article is considering a broader population than the military population and it's in the causal determination of whether ozone exposure causes asthma severity, you would say that she's using this causal framework in a novel fashion, correct?

A. I can't answer that unless --

MR. TUBIN: I think he's asked to review the document --

MR. TELAN: I get to ask hypotheticals.

MR. TUBIN: -- to continue answering the question. So you're not going to let him review the document?

MR. TELAN: I'm not going to ask him -- no, I'm not going to let him review the document, because I'm asking him a hypothetical, which I'm allowed to do.

BY MR. TELAN:

Q. So if you accept my hypothetical question that this article encompasses a population

broader than the military, would your answer to the question of whether or not this is a novel framework be, yes, it is, or, no, it's not?

A. I can't answer that question, because I don't know how real that hypothetical is, but having said that, I don't know that your assumption that this is not applicable to veterans, you'd have to ask Dr. Goodman why she used the 2008 versus the 2015 that revamped entirely the 2008 criteria for presumptive disability.

Q. Okay. So why don't we do this? Let's take our lunch break, and you can read this as you like, and then we can come back and discuss whether or not it's a --

A. I'm not going to take my lunch break time to read this. We can do it -- give me two minutes, and we can do it on the record, and I'll be able to give you a better answer, not more than two minutes.

Q. If your answer is that it doesn't include the military population, will you agree to give me my two minutes back?

A. I don't think so. It won't take me long to review this if you want.

Q. Go ahead.

MR. TELAN: Back on the record.

VIDEOGRAPHER: We're still on the record.

MR. LEE: We didn't go off.

MR. TELAN: Oh, we didn't go off? Okay. Good.

A. Okay. So I don't see that this paper has a particular focus on veterans. I don't know why she would use a veteran's presumptive disability as opposed to EPA or IARC or other widely accepted methods for weight of evidence. I can't explain why she would, because that's not in this paper.

BY MR. TELAN:

Q. It's a peer-reviewed journal, isn't it?

A. I believe it is.

Q. So would the folks who were doing the per review generally consider whether they believe somebody is acting contrary to the bounds of science before they submit it for publication?

A. Not always. We don't know what the reviewer said to Dr. Goodman and how Dr. Goodman responded to the journal. They may have raised the question. They may not have raised the question.

Q. So as it stands, would you say that in 2018, when this was published, Dr. Goodman was acting

in a novel fashion by applying this causal framework?

MR. TUBIN: Objection to form.

A. I don't know how to answer it in terms of novel. As I said, I've not seen this context before. How she did it and what the justification is is something you have to ask her, but this is -- the concept of equipoise is not something that's widely used in cancer causation assessments. Again, I haven't seen it in EPA, IARC, NTP or ATSDR other than Dr. Bove's 2017 report.

BY MR. TELAN:

Q. And Dr. Bove's 2017 report was published prior to Dr. Goodman's report, which is marked as Exhibit 6, correct?

A. Yes.

MR. TELAN: Why don't we take our lunch break now? Do you want to do 45?

THE WITNESS: That's more than enough, yeah.

VIDEOGRAPHER: We're now going off record. The time is 12:55.

(A recess was taken from 12:55 to 1:52.)

VIDEOGRAPHER: We are now back on the record. The time is 1:52. You may continue.

BY MR. TELAN:

Q. Dr. Shields, when we left off, we were chatting a little bit about tobacco and the industry. I want to shift gears on you just a little bit.

MR. TELAN: We'll have the next exhibit marked. I think we are at 7 now?

MR. TUBIN: Yep.

(Exhibit 7 was marked for identification.)

BY MR. TELAN:

Q. Have you ever heard of the benzene task force?

A. I think so.

Q. What is your understanding as to what that is?

A. I don't know. It sounds familiar, but I'm not recalling anything about it.

Q. Do you have an understanding that it's a conglomeration of companies formed through the American Petroleum Institute that seek to develop science in favor of industry specifically as it relates to benzene?

MR. TUBIN: Objection. Form.

A. It's making no -- it's not ringing any bells.

Q. Okay.

MR. TELAN: Mark this as the next exhibit, one to the deposition.

BY MR. TELAN:

Q. I am sure that you've not seen this document, but does the name "Mary Paxton" ring a bell to you?

A. Yes. But I don't remember from what.

Q. You cited to her in your report --

A. Okay.

Q. -- Dr. Mary Paxton. And is it fair that this is an email that's got American Petroleum Institute at the top, dated January 25, 1993, where Dr. Paxton is talking about a meeting of the benzene task force in Washington?

A. That looks right.

Q. And I don't know. You looked like you were going to your computer, so maybe you typed in Paxton?

A. Exactly, yes. I mean, there's at least three papers I'm seeing now.

Q. Understood. By any chance, do any of those have to do with benzene?

A. Those three I'm looking at is -- all of them do.

Q. Yes. Okay.

MR. TELAN: Let's go to the next numbered exhibit.

MR. LEE: Number 8?

BY MR. TELAN:

Q. Oh, I'm sorry. Let's go to page 2 of that exhibit. Do you have a second page of that exhibit?

A. Yes.

Q. She says at the bottom of the first page that attached is a copy of her proposal "submitted by Lovelace on benzene metabolism and dosimetry on the biomarkers of benzene exposure."

You saw that, right?

A. Yes.

BY MR. TELAN:

Q. Are you familiar with Lovelace Biomedical?

A. Yes.

Q. And what is Lovelace Biomedical?

A. It's one of the labs by, run by the Department of Energy.

Q. Okay. And this second page of Exhibit 7 is a draft proposal for the study of biomarkers of exposure to benzene submitted to the

API, right? At least it's the cover sheet for that, correct?

A. It's just for the study of dosimetry of benzene in the bone marrow.

Q. Yes. Okay.

Let's go to the next exhibit.

MR. LEE: Number 8?

MR. TELAN: Number 8.

(Exhibit 8 was marked for identification.)

BY MR. TELAN:

Q. I am sure you've not seen this. If you look at the top, does it say "Exxon Biomedical Sciences"?

A. Yes.

Q. And if you look at the first paragraph, do any of the names Tom Armstrong, Michael Bird, Steven Phillips, Rob Schnatter and I met with members of the National Cancer Institute on February 13th, 1995. Any of those names ring a bell with you?

A. I know Schnatter is an author. The other names are not ringing bells.

Q. Do you know how many times you cited to Dr. Schnatter in your report?

A. I don't know offhand. He's had dozens

of publications around benzene.

Q. Okay. If you wouldn't mind, just read the next sentence of that paragraph.

A. Okay. Do you want me to read it out loud?

Q. Yeah. Read that, yeah.

A. "We are monitoring the NCI studies because of their potential" --

Q. I meant the one above that, "The purpose of the meeting."

A. Oh. "The purpose of the meeting was to discuss with NCI investigators their studies of workers exposed to benzene in the People's Republic of China and for us to describe some of the work with which Exxon is involved in Canada, the UK and Australia."

Q. If you go down to paragraph 2, would you read that paragraph into the record?

A. "We are monitoring the NCI studies because of their potential impact concerning health risks at low benzene exposure and their interaction with key activities currently underway within and outside Exxon. These activities include the IP Epidemiology Study, the European Union Benzene Risk Assessment and the IOL Worker Study. The EBSI team

summarized our work on benzene using materials previously cleared for release."

Q. If you go down to the last paragraph, would you read that paragraph into the record, please, actually, the first two sentences?

A. "While their studies are still in early stages, some initial results have been reported from the cohort study. In addition to increases in acute myelogenous leukemia (a known target site), excesses were also noted for several other diseases of the blood-forming system, such as non-Hodgkin's lymphoma, lymphoid leukemia and aplastic anemia."

Q. This is dated February 28th, 1995, by Exxon, and you see it's at the top, it says "Limited Distribution," right?

A. Correct.

Q. You've never seen this before, right?

A. No.

Q. Does this appear that there's a discussion about an ongoing study in this email?

A. Yes.

Q. If you turn to the second page -- I'll take some of the load off your back. I'll read this for you.

"Although motivated investigators from

the NCI, the Chinese Academy of Preventive Medicine and consulting organizations are participating in the research, several important methodological issues could influence study quality and conclusions."

Did I read that correctly?

A. Yes.

Q. And then the number 1 -- I'm just going to read the first entry. "Accuracy of benzene exposure data."

Did I read that correctly?

A. Yes.

Q. "Number 2, assessment of other exposures," correct?

A. Yes.

Q. "Number 3, case ascertainment and verification," correct?

A. Yes.

Q. Under "case ascertainment," it says, "At least one incentive exists for more complete reporting or overreporting of leukemia in benzene workers than in other members of the population. If leukemia occurs in benzene-exposed workers, compensation payments are made to the family. Thus, a potential bias exists for leukemia to be reported preferentially for benzene workers compared to the

study 'controls.'" Do you see that?

A. Yes.

Q. And then the last is "Accuracy of diagnoses of solid tumors." Is that correct as well?

A. Yes.

Q. Now, at the end, last paragraph, it reads, "The NCI studies do not discretely address the low dose exposure region of current regulatory and risk assessment interest. However, because future interpretations or findings could imply lower dose effects and impact policy, it is important that we continue to monitor these studies. NCI will present some of its results in the June benzene conference at Rutgers University and anticipates publications in late 1995 or early 1996."

Did I read that correctly?

A. Yes.

Q. And Dr. Schnatter is one of the people that's cc'd at the bottom of that page as well, correct?

A. That's right.

Q. Okay. Let's go to the next one.

(Exhibit 9 was marked for identification.)

BY MR. TELAN:

Q. So I'm showing you what's been marked now as Exhibit 9. And this is a draft of a document from Robert Drew at the American Petroleum Institute to Jeffrey Foran at the Risk Science Institute, International Science Institute in Washington, D.C. Do you see that?

A. Yes.

Q. Okay. Without reading this verbatim, I'll let you skim the first, ask you to skim just the first paragraph, if you would. Just tell me when you're finished.

A. Okay.

Q. Does it appear that the benzene task force of the API wanted to undertake a project to address the genetic toxicology of benzene?

MR. TUBIN: Objection to form.

A. Yes.

BY MR. TELAN:

Q. And, then, in the second paragraph, are they discussing funding a workshop on genetic toxicology and risk assessment through the institute?

A. That's what it says.

Q. And then in the third paragraph, I'll let you take a look at that briefly as well. Just let

me know when you're done.

A. Okay.

Q. Okay. Does it look like there's some concern being expressed that the original intent of the project was evolving away from their original thoughts and now that they're using the case study in an at-risk assessment based on the cancer assessment guidelines?

MR. TUBIN: Objection to form.

A. That's what I'm taking away from that paragraph.

BY MR. TELAN:

Q. The sentence in the middle of the paragraph says, "We agree that the proposed guidelines are an important framework for the consideration of human health risk assessment, because they (or an amended force of them) will be what we probably live with for the next decade."

Did I read that correctly?

A. Yes.

Q. "However, API has some serious concerns about some aspects of the charge to the authors of the discussion papers as set forth in the September 27, '96, memo."

Did I read that correctly?

A. Yes.
Q. If you go to the next page over and scan that briefly, I'm not going to read it all into the record, but just had a quick question for you on that.
A. Okay.
Q. What is your takeaway from that page that you just read?
A. So if I'm understanding this, with this quick read, there's ways of assessing benzene's effect in a laboratory using cell culture data. What they're referring to is genetic toxicology data and whether genetic changes in the cell cultures could reflect a dose-response relationship for cancer risk in humans, and they've got concerns over using that or how it's going to be used and that they think it should be taken out of this workshop that's being planned.
Q. Is the last paragraph where they're suggesting that if there are any member concerns from the benzene task force, that they respond to Dr. Paxton to indicate how instructions to the authors would be modified?
A. I don't know about the benzene task force. This is ILSI, which I think is different.
Q. The Life Science Institute?

A. Connect.
Q. Do you know one way or the other if this is part of the benzene task force?
A. I don't, but the letter is addressed to Dr. Foran at the International Sciences Institute.
Q. Let's go to the next numbered exhibit, which is in 1999. We are at number 10, I think.
MR. TUBIN: Yep.
MR. TELAN: Yeah.
(Exhibit 10 was marked for identification.)
BY MR. TELAN:
Q. This is a 1999 summary of a conference call. Do any of the names of the participants on that conference call sound familiar to you other than Dr. Schnatter that we talked about?
A. Only Raabe or Raabe as an author in some paper I might have read.
Q. If you go down about halfway down the page, it says, "Rob Schnatter indicated that write-ups of two of the proposed studies should be completed by mid-December. (Otto Wong's draft proposal study of NHL has already been prepared.)"
Did I read that correctly?
A. Yes.

Q. And you've cited to Dr. Wong a number of times in your report as well, right?

A. That's correct.

Q. If you go down one more paragraph, it says, "There was general agreement that API would offer the panelists $1,000 a day honorarium for two days' effort (one day to review the studies and the second to attend the meeting). It was also agreed that both Otto Wong and Rich Irons should be invited to the meeting of the review team and that the funding for this should come from the API-EBSI contract."

Did I read that correctly?

A. Yes.

Q. And does Richard Irons also sound familiar?

A. He's also an author of papers that I have read and cited.

Q. Have you come to learn that all of the folks that we've been mentioning so far were actually employed by chemical manufacturers when they wrote or participated in writing the articles that you've cited?

MR. TUBIN: Objection to form.

A. The only one that I know of is Schnatter. I have to go back and see whether

Otto Wong's papers that I cited, who funded those studies or where he was employed. I don't know either way.

BY MR. TELAN:

Q. Do you agree that the relationship of these authors to these companies would create a risk of bias?

MR. TUBIN: Objection to form.

A. So when you evaluate a paper, you're looking at the scope, size, quality, presence of confounding and bias. The other thing you look for is conflicts of interest, and that's taken to an account, where they published it. Does the method sound sound?

You know, because it comes from a company doesn't disqualify it. Lots of times these companies are criticized because they don't do enough research, and then they get criticized when they do research, but the potential conflict of interest is one of the things that I explicitly consider, and that's in my report.

BY MR. TELAN:

Q. These are all for-profit companies like ExxonMobil and Shell, right?

MR. TUBIN: Objection to form.

A. ExxonMobil and Shell is. I don't know

whether ILSI is for profit or API is for profit.
BY MR. TELAN:
Q. Schnatter worked at ExxonMobil, right?
A. That's my recollection.
Q. And that's a for-profit company?
A. ExxonMobil, I assume so.
Q. So if you work for a company where the results of a study impact profit, does that create, in your mind, an opportunity for bias in the study itself?
MR. TUBIN: Objection to form.
A. It's one of the considerations that one takes into account, and no study stands alone, so it depends on how the study methodology, analytic plan and the results compare to other studies that have been published. The discussion I take into account in terms of what their interpretation is, but what's more important to me is methods, the physical analytic plan and the results in how that compares to, for example, the NCI studies that are being discussed in these documents.
BY MR. TELAN:
Q. Did you in your paper report that any of these authors were, in fact, employed by industry like ExxonMobil?

A. Which paper?

MR. TUBIN: Objection to form.

BY MR. TELAN:

Q. I'm sorry. In your report.

A. No, I didn't comment about that -- in most -- occasionally, I'll say something like studies from the National Cancer Institute. Otherwise, I have not indicated for any of the studies who were the funders or where they're from.

Q. But you've done work for API, have you?

A. I don't believe so. I think I've attended one meeting for them, but I haven't done any work for them that I can recall.

Q. What do you recall about the meeting you attended for them?

A. It was in a little conference room in D.C., a bunch of people in the room, and I don't even remember what the topic was. I don't remember the topic.

Q. Was that while you were at Georgetown or at Ohio State?

A. Definitely not at Ohio State. I don't recall whether I was working for Georgetown or the National Cancer Institute.

Q. If we continue on this, if you go down

to the very bottom of that last sentence says, "The next step will be to identify other petrochemical companies as possible coalition members and have a larger meeting with technical and business people. This will take place after the expert panel meeting."

Did I read that correctly?

A. Yes.

MR. TELAN: Okay. Let's go to this next document here. This will be 11, I believe.

(Exhibit 11 was marked for identification.)

BY MR. TELAN:

Q. As a general principle, you agree that when a company, a chemical company like Exxon has to deal with more strict government regulations, that often results in a diminishment of the bottom-line profits. True?

MR. TUBIN: Objection to form.

A. Can you say that again?

BY MR. TELAN:

Q. Sure. That when petrochemical companies like ExxonMobil have to deal with stricter environmental and governmental regulations, that that often impacts the bottom line detrimentally?

MR. TUBIN: Objection to form.

A. I don't know. I'm not an economist or know how regulations may help or hurt them in terms of their profits.

BY MR. TELAN:

Q. You're a smart man, who's done a lot of schooling. Are you saying that you don't think that more strict regulations of things like pollution control would result in a lower profit for a company that has to deal with less strict pollution controls?

MR. TUBIN: Objection to form.

A. So it depends on the cost. The first thing that comes to mind is the airline industry fought like heck to keep a ban of smoking in the airplanes, and when they banned the smoking in the airplanes, they realized their profits went up, because they had to do less ventilation. So I understand what you're saying. I'm sure in some cases, regulation ends up costing more, and in other cases, it may not have an impact at all in terms of cost.

BY MR. TELAN:

Q. If we're looking at number 11, it says, "This document describes a project to investigate the dose response and mechanistic aspects of the

hematological effects of benzene exposure in a population of workers in Shanghai China."

Do you see that, the first sentence of the first paragraph?

A. Thank you. Yes, I see that.

Q. And you do, in fact, cite to Shanghai Chinese studies in your paper, correct?

A. There's several. There's one that was by Irons, et al., and Wong, et al. They have several publications. And then there's another Shanghai, China, cohort that's out of, initially, Vanderbilt and then went to Pittsburgh, and it's also referred to as the Shanghai Cancer Cohort.

Q. Okay. If you go to the first sentence underneath "Background," "An accurate understanding of the true relationship between benzene exposure and the risk of hematopoietic disease such as AML would be of tremendous economic benefit to the petroleum industry and other industries in which benzene occurs at a constituent of products, precursors or waste streams."

Did I read that correctly?

A. Yes.

Q. What do you think they're saying there?

MR. TUBIN: Objection to form.

A. You know, I can't get into their head.

What they're saying -- you know, from where I sit, what they're saying is if they can understand if they can better control benzene exposure with less AML, they're probably less on the hook for compensating people who develop AML, so that would be a tremendous economic benefit.

BY MR. TELAN:

Q. Take a look at the next sentence, if you would read that into the record.

A. "Currently, regulatory bodies rely on health conservative default assumptions that intentionally inflate estimates of risk whenever there is uncertainty about aspects of the risk estimation process."

Q. What does that mean to you?

A. Well, they are -- they are describing what is well known as the precautionary principle when regulatory bodies are looking to regulate exposures to maximize preventive benefits. When they have uncertainty, they will assume worse situations rather than better situations, so that we don't find out in 20, 30 years we got it wrong and there's more cancer, disease, whatever, than was thought about 30 years earlier.

Q. If you go down to the last paragraph,

it says, "Regulatory standards which set 'acceptable' levels of benzene in environmental media are based on the same default-driven theoretical estimates of leukemogenic risk that have been applied to air toxics legislation. Benzene-based standards frequently drive risk estimates during remediation of former petroleum facilities, which translates into excessive amounts of dirt hauled away as hazardous waste and extensive pump and treat activities for groundwater."

Did I read that correctly so far?

A. Yes.

Q. "Waste streams and by-products of petroleum production activities, although currently exempted by law, can contain levels of benzene that would otherwise result in these materials being regulated as hazardous waste. Loss of the petroleum production waste exemption could lead to massive expenditures for E&P operations in the future."

Did I read that correctly?

A. You did.

Q. Does that appear that they're talking about how these regulations impact their bottom line?

MR. TUBIN: Objection to form.

A. You know, this is so far out of my expertise as a layperson, I would agree with you, but

I don't know that an expert would or would not disagree with you, but this is way out of my expertise.

BY MR. TELAN:

Q. Let's go to the next page. This may be up the alley here.

"Litigation costs due to perceptions about the risks of even very low exposures to benzene cost American industry millions of dollars annually."

Have I read that correctly?

A. Yes.

Q. "Although only acute myeloid leukemias have any strong scientific support for linkage with benzene exposure at any levels, lawsuits are filed alleging causal relationships between benzene exposure and virtually every type of hematopoietic cancer and some non-neoplastic diseases such as myelodysplastic syndrome."

Did I read that as well correctly?

A. Yes. As you're reading that, I'm actually looking for a date -- or whose document is this? Who's writing this?

Q. We'll get there. We'll get there.

A. Okay. I guess I kind of want to know that now so that I can understand the context of why

this is being written.

Q. The next sentence says --

A. So you're not gonna give it to me?

Q. We're going to keep reading it through.

A. Okay.

Q. "An epidemiology study conducted in China has reported an association between occupational benzene exposure and non-Hodgkin's lymphoma (NHL). Although this study has been criticized in the peer-reviewed scientific literature for several serious flaws, it has resulted in an increase in NHL-based litigation."

So that paragraph that we just read there, does that indicate that the industry is concerned about the litigation costs?

MR. TUBIN: Objection to form.

BY MR. TELAN:

Q. Question mark?

A. Yes. I am just reviewing the document so I can understand this.

Q. I'll direct you to it. Okay?

Go to 44257. If we go toward the bottom of the first -- the second paragraph, "Currently, through Dr. Otto Wong, we have contacts with the departments of public health and hematology

of Shanghai Medical University. Through that institution, we have contacts with the Shanghai Tumor Registry and the Shanghai Center for Disease Control, which is the governmental repository for workplace exposure information. Protocols are under current development based upon the results of an in-depth feasibility study conducted in August 1999 by Exxon Biomedical Sciences, Inc. and Dr. Richard Irons of the University of Colorado and funded under the 1999 budget."

We had previously read the minutes of the 1999 meeting in the benzene task force call, did we not?

MR. TUBIN: Objection to form.

A. I think that's correct.

BY MR. TELAN:

Q. And the same authors, Otto Wong and Richard Irons, are mentioned in this document as they were in the previous documents as well, correct?

A. That's correct.

Q. And there's a feasibility study being conducted by ExxonMobil that they are speaking about, correct?

A. Correct.

Q. If you go to the next page, top

paragraph, second sentence, "The study will be performed by Dr. Richard Irons of the University of Colorado with the collaboration and assistance of investigators from the departments of hematology and public health of Shanghai Medical University."

Did I read that correctly?

A. Yes.

Q. Now, if you go to the last page, "Location: The location for this proposed project is Shanghai, China." Correct?

A. That's correct.

Q. Halfway down, "A feasibility study group funded by the API Benzene Task Force was shown records of industrial hygiene monitoring of work areas where benzene was routinely used and where airborne benzene concentrations occasionally were in excess of 100 parts per million and where a rare data point could exceed 200 parts per million."

Did I read that correctly?

A. Yes.

Q. Does this give you ideas as to what's being discussed here now?

A. Yeah. I'm familiar with the study.

Q. And they're listed under the investigators Otto Wong, Dr. Schnatter and Dr. Irons.

Do you see that, correct?

A. Yes.

Q. And then finally on the last page, "Project Costs," does it state that they're discussing project costs in excess of $6.5 million over a period of five years?

A. That's what it says.

Q. And they were talking about how much it would cost the 10 to 12 members of the benzene task force to fund the study, correct?

A. That's right.

MR. TELAN: This is 12.

(Exhibit 12 was marked for identification.)

BY MR. TELAN:

Q. When we looked at the prior memos kind of leading up to this, what is your sort of gestalt, if you will, about the tremendous economic benefit that the benzene task force is talking about for their industry as it relates to the study that's being proposed?

MR. TUBIN: Objection to form.

A. I'm not sure how to answer that. Again, you're way out of my expertise. My understanding of this study was funded by industry to

using acceptable methods to answer questions that needed to be answered about risk from benzene. The NCI had a series of studies. The industry had concerns about that and also wanted to fund a study to contribute to the greater scientific knowledge.

BY MR. TELAN:

Q. And the folks that they were talking about working on the study were all employees of their companies, right?

MR. TUBIN: Objection to form.

A. You asked me that before. I don't know that either way. I'm going to have to go back to the papers to see whether they were working in industry. For example, I think Irons was not. I think Irons was at the University of Colorado. I don't know where Otto Wong was at the time.

BY MR. TELAN:

Q. Okay. If you go -- actually, look at page 2. I think this was stapled in a reverse order. This is an email from Robert Schnatter -- or not an email, but maybe it's an email -- from Robert Schnatter to Ralph. Do you see that?

A. Yes.

MR. TUBIN: Objection.

BY MR. TELAN:

Q. And they're talking about the proposed Shanghai studies?

A. That's right.

Q. And Robert Schnatter, who's with Exxon, is talking about a document that was presented by Texaco at a meeting the prior month, right?

MR. TUBIN: Objection. Foundation.

A. Yes.

BY MR. TELAN:

Q. And the name Gary or Jerry Raabe was a name that you're familiar with as well?

A. The name is familiar. Whether it's Jerry or someone else, I don't know offhand.

Q. If we go to the actual document itself, under "Background," if you want to read that into the record, please.

A. The whole paragraph?

Q. Yes.

A. Okay. "Benzene is a naturally occurring constituent of crude oil and a contaminant of many petroleum products. Its average concentration in gasoline is on the order of 1 percent. Thus, benzene is emitted from both upstream and downstream sources and impacts air, water and waste issues. This

substance has received much attention from regulatory agencies and in tort litigation because benzene has been accepted as causing leukemia and other blood disorders in workers exposed to high concentrations."

Q. Let me stop you there for one second. In this memo, the scientist at Texaco, Dr. Schnatter, is talking about benzene causing leukemia and other blood disorders, correct?

MR. TUBIN: Objection to form.

A. That's what it says.

BY MR. TELAN:

Q. What other blood disorders in pre-2001 was benzene known to cause other than leukemia?

A. Other than acute myeloid leukemia and not other leukemias? The only other one would be aplastic anemia.

Q. And Dr. Schnatter didn't use AML. He said leukemia, correct?

A. That's correct.

Q. If you would continue on.

A. "It is classified as a known human carcinogen by both national and international agencies that deal with environmental health issues. Recent studies by the National Cancer Institute have raised concerns that another hematopoietic cancer, not

previously related to benzene (non-Hodgkin's lymphoma), also may be associated with exposure to benzene."

Q. Okay. If you would read the first sentence of the next paragraph.

A. "Concern about adverse health risks of benzene, in part, drives calls for the reformulation of gasoline, changes that have massive financial impacts on petroleum refiners."

Q. Is there any doubt in your mind now that the industry that is funding these studies is very concerned about profits?

MR. TUBIN: Objection to form.

A. So we're talking about not studies, one study with several publications from the Shanghai -- I forget what they call this study by Irons and Wong and other ones, but that's what they wrote, and the document speaks for itself.

BY MR. TELAN:

Q. I know the document does speak for itself. I'm asking you, in your mind, as an educated scientist, is there any doubt that what you're reading here is that the petroleum industry is very concerned about the effect that the recent attention on benzene is going to have on profits?

MR. TUBIN: Objection to form.

A. That is their concern, so they're doing the study to identify whether that, in fact, will be reality for them.

BY MR. TELAN:

Q. And they are using -- strike that. Okay.

The next sentence says, "The level of benzene contamination is a major determinant of the extent of required cleanup of many petroleum-contaminated media, such as soil and water. Finally, concerns about localized impacts from benzene in ambient air are the basis for initiatives to control emissions from stationary sources for such diverse facilities as E&P, petroleum waste-treatment sites, gas plants and marketing facilities."

So in this one paragraph, number one, are they talking about the fact that reformulating gasoline would have a massive financial impact on the industry?

MR. TUBIN: Objection to form.

A. That is their concern --

BY MR. TELAN:

Q. The second --

MR. TUBIN: Please don't interrupt.

A. -- as opposed to that being a reality, so predicting the future.

BY MR. TELAN:

Q. And the second concern is that it's going to cost them more to clean up the benzene spills, based on the concerns being given to benzene, correct?

MR. TUBIN: Objection to form.

A. Again, it's concerns about the future.

BY MR. TELAN:

Q. Okay. And the third concern about the future is that the attention that benzene is getting may result in initiatives to control emissions from stationary sources, like petroleum factories, correct?

MR. TUBIN: Objection to from.

A. That's right.

BY MR. TELAN:

Q. If we go to "The Research Approach," what Dr. Schnatter says here, if you would read that into the record, please.

A. "The scientific research program developed over the years by API's Benzene Task Force is designed to protect member company interests by developing strong scientific information on key benzene risk issues. This data, applicable across

environmental media, has use in advocacy, risk management, litigation and risk communication."

Q. Let me stop you there for a second. What are they saying there?

MR. TUBIN: Objection to form.

A. That they want to develop data on key benzene risk issues so that they can deal with whatever they need to deal with in terms of risk management litigation, risk communication. It doesn't say that they're predicting or they're designing studies to provide bad science or junk science. It says that they're gonna provide data that's gonna inform key benzene issues that does have applicability across environmental media, advocacy, risk management, litigation and risk communication.

BY MR. TELAN:

Q. Did you see anywhere in here that the companies were controlled about the safety of the workers or the general public around their facilities?

A. For their workers, I would assume probably facilities around, the environment around their facilities would be within the risk management context.

Q. They're concerned about the cleanup costs and the costs of the emissions from their

factories, not about health care of the folks who might be impacted by benzene?

MR. TUBIN: Objection to form.

A. I don't agree with that. Again, you're out of my expertise, but when I hear "risk management," I'm talking about or my understanding is that is reducing developing data about the health risks related to exposures.

BY MR. TELAN:

Q. When they say that this "scientific research program ... is designed to protect member company interests," what is it they're talking about there?

MR. TUBIN: Objection to form.

A. Well, what it seems to me is that they're not saying we're going to doctor the data so that it helps us in terms of our profits. What it's saying is that they're going to develop the data, and hopefully, it's accurate data, so that someone else doesn't overblow the exposures and the interpretation so that they can have their own company interests protected. So, like, the data will be where the data is, but they want accurate data so they can deal with whatever they need to deal with.

BY MR. TELAN:

Q. You're interested in objectivity and truth when it comes to science, right?

A. I would assume that, because I read their papers. That's what I took away.

Q. Did you take that away from the smoking industry?

A. No. I had seen explicit documents from the smoking industry specifically looking to manipulate, falsify, reinterpret and hide data. That's not what any of these documents are. These documents raise exactly the opposite. They're saying let's go do the studies so we can get data about key benzene risk issues.

Q. Didn't smoking do exactly this, that is, develop scientific data to try and get out in front of the science?

MR. TUBIN: Objection to form.

A. Absolutely not. They develop studies, and any of those studies that would actually hurt them, they buried them as opposed to publishing it. In this case, they published their data.

The industry also falsified data. The industry particularly funded certain researchers with predetermined outcomes, and the industry also had

lawyers review all the papers before they were published, so that they can make sure that they had a safe spin for the industry. That is not my understanding of what the Irons and Wong Shanghai papers were doing.

BY MR. TELAN:

Q. How would you know if one of these companies was burying data?

A. Because in all the benzene litigation that I have, if those documents existed, I probably would have seen them by now.

Q. Have you seen these documents yet?

A. I haven't seen these, but these are not what you're talking about. I've seen documents like this. I've read articles about this. What this is saying is we've got to do the studies. We're about to get a massive hit in terms of finances, so we've got to find the data. Let's fund the studies. That's a totally different thing than what you're talking about with the tobacco industry.

Q. What articles have you read on this?

A. The Irons articles, the Wong articles. I mean, there's three or four, I think, that are cited in my report.

Q. They go on to say, "It is anticipated

that the results of this research will establish that 1), ambient levels of benzene exposure do not pose a risk of leukemia or other blood diseases to the general public."

Did I get that right?

A. You wrote that -- you read that correctly.

Q. So they're predicting or forecasting the results of studies that have not yet been done, correct?

MR. TUBIN: Objection to form.

A. They're stating their hypothesis, and it may be that the results of the research will or will not establish that.

BY MR. TELAN:

Q. Well, they were -- they were betting on it not harming the general public by not posing a risk of leukemia and other blood diseases. Isn't that what they say?

MR. TUBIN: Objection to form.

A. I mean, I can't -- I can't tell you what they were betting on or not betting on. It looks to me like they are saying what they anticipate the results probably based on prior published data that they had, and that was their anticipation of what they

thought was a high quality study, that this is what it would find, and if it doesn't, then it doesn't.

BY MR. TELAN:

Q. And the last sentence in that paragraph, "Such findings would significantly ameliorate further regulatory initiatives in the area of point source emissions and motor gasoline reformulation."

Did I read that correctly?

A. That's right.

Q. Now, this is coming from the head scientist on the project, right?

MR. TUBIN: Objection to form.

A. I don't know that he was the head scientist or not.

BY MR. TELAN:

Q. How would the head scientist be able to predict what the results of an untested hypothesis were?

MR. TUBIN: Objection to form.

A. Based on substantial research from before that by Rinski, for example, and others, this was not the first benzene risk study to be done.

Q. So let's go to the first paragraph again. I want you to see how these jibe, and I'll

read this into the record.

"The substance received much attention from regulatory agencies in tort litigation, because benzene has been accepted as causing leukemia and other blood disorders in workers exposed to high concentrations."

And now go down to the paragraph that we just read, the sentence, "It is anticipated that the results of this research will establish that ambient levels of benzene exposure do not pose a risk of leukemia or other blood diseases to the general public. "Such findings" -- and then "that adherence to current occupational limits do not create an unacceptable risk to workers."

Did I read that correctly?

A. You did.

Q. Okay. So Dr. Schnatter is, in fact, forecasting the results of a study yet to be done?

A. It's what his anticipation of the study results would be.

Q. If we go down to "Specific Research Projects," the first paragraph, they're talking again about the Shanghai, China project.

The middle of the paragraph, where it says, "The Benzene Task Force," do you see that?

A. Yes.
Q. "Has allocated funds to help develop detailed research project protocols." Is it appropriate for these for-profit companies to be collaborating on a project protocol like this?
MR. TUBIN: Objection to form.
A. Not only is the answer yes, but it's more common that they get faulted for not doing the research. So in this case, these companies are banding together to do research, develop the data and subject it to peer review publication.
Q. Okay. Last bullet point on this first page states that the "API-sponsored benzene research continues efforts to resolve the issue of whether ... benzene, or its metabolites, actually chemically binds to DNA."
Did I read that correctly?
A. I don't think you used the word, "whether or not benzene." I think you just said "whether benzene."
Q. "Whether or not benzene." Is there a difference? Whether or not or whether, is there -- is that a distinct difference?
A. Well, it emphasizes to me that the data, what they're saying is they're envisioning

whether it does or it doesn't is how I interpret that.

Q. Okay. The "distinction has important regulatory implications, because these agencies currently assume that benzene alkylates DNA and, therefore, no level of benzene exposure is without some finite degree of carcinogenic risk. Preliminary results of API-sponsored research suggest that, contrary to present assumptions, benzene does not bind to DNA."

Did I read that correctly?

A. Yes.

Q. Is it appropriate for the preliminary results to be released to the sponsor of the studies?

MR. TUBIN: Objection to form.

A. That's not only appropriate, but that's regularly done.

MR. TELAN: Okay. Let's put that away.

The next study is the Benzene Shanghai Study Background. I think we're at 13?

MR. TUBIN: Yeah.

(Exhibit 13 was marked for identification.)

BY MR. TELAN:

Q. And this is, again, Dr. Schnatter?

MR. TUBIN: Do you have a copy for us?

MR. TELAN: Oh, I thought I gave it to you. I'm sorry.

MR. TUBIN: Thank you.

A. It looks like to be a PowerPoint presentation by Dr. Schnatter, or at least his name is on the front.

BY MR. TELAN:

Q. If you go back to the timeline, it goes back to 1974, correct?

A. 1994.

Q. I'm sorry. 1994. And we're now in 2001 as the date of this PowerPoint right?

A. Correct.

Q. The first entry on the PowerPoint is that there's "National Cancer Institute Exposure Estimating Report" and writes "Concern" out to the side there, correct?

A. That's what it says.

Q. And then, in 1996, there's a National Cancer Institute report indicating "7.6 parts per million blood effects"? True?

MR. TUBIN: Objection to form.

A. That's what's written.

BY MR. TELAN:

Q. And then in 1997, an "NCI dose-response

analysis" with "AML/MDS and NHL effects," correct?
A. That's what it says.
Q. And MDS is myelodysplastic syndrome, right?
A. That's right.
Q. Okay. And then in between '97 and '98, there's a little kind of abbreviation there in the middle, "O. Wong trip, exposure assessment feasible. " Do you see that?
A. Yes.
Q. And that's Otto Wong, the same scientist we've been talking about?
A. I assume so.
Q. And in 1998, it says "BZ State of the Science Conference." BZ, I'm assuming, is benzene. Fair?
A. I would assume that too.
Q. And it says, "No more benzene diagnosis," off to the right?
A. Dx often is referred to as diagnosis, but I'm not sure that makes sense in this context.
Q. Okay.
A. Maybe disease.
Q. Okay.
A. I don't know what that stands for.

Q. And in 1999, "Armstrong, Irons, Schnatter trip, benzene-induced disease present" or "diagnosis present."

A. Or something else.

Q. Right. Okay.

And then you see there's consortium building and then a meeting in 2001 that they're talking about, correct?

A. Correct.

Q. Okay. If you go to the next page -- let me ask you this. Is it odd for the scientist who's in charge of a project to be talking about the effect of the results of the project on profits?

MR. TUBIN: Objection to form.

A. I don't know what happens within industry, so I can't answer that question.

BY MR. TELAN:

Q. That doesn't strike you, as an epidemiologist, as being odd?

MR. TUBIN: Objection to form.

A. Can we go back to which document you're talking about, where you were talking about profits? I want to make sure I'm not getting confused between Schnatter or other documents.

BY MR. TELAN:

Q. Sure. The one right before it, I think we're at 12.

A. Yes. So you're assuming that the first page is written by Schnatter, which has a different font than the actual second page, which just says, "Attached are some materials regarding proposed Shanghai studies." It doesn't -- it says the document was presented by Mike Redeemer of Texaco. So it was not written by Schnatter.

So, again, I don't know which document you're talking about. What Schnatter was saying, that it impacts the profits. It seems to me that all the documents you showed me were by API and member groups and not Schnatter or Wong or Irons.

Q. You do see at the very bottom that the Bates stamp has Shell and two consecutively marked Bates stamp pages there?

A. Yes. It has a Shell Bates stamp.

Q. And they are consecutively marked?

A. Yes.

Q. Let's go back to 13.

VIDEOGRAPHER: The Zoom just shut down.

MR. TUBIN: We are coming up on an hour.

VIDEOGRAPHER: Do you want to go off record?

MR. TELAN: What's that?

MR. LEE: Let's go off. She needs some water.

VIDEOGRAPHER: We are now going off record. The time is 2:47.

(A recess was taken from 2:47 to 2:58.)

VIDEOGRAPHER: We are now back on the record. The time is 2:58. You may continue.

BY MR. TELAN:

Q. Okay. Let's go back to 13, if we could, and if you can turn to, let's see, 44374. Do you have Bates stamped pages at the bottom of that page?

A. I do.

Q. Under "Background," at the top, does it say "International Leveraged Research Proposal"?

A. Yes.

Q. And it's speaking about "an investigation of the effects and dose response of hematological effects of benzene ... in Shanghai," right?

A. That's correct.

Q. This is the project that's been

reflected in several of the exhibits we've covered. True?

A. Yes. And this is a document that I have seen before, and it appears, I believe, on the API website.

Q. Do you see it as part of this case?

A. No. I'd seen this in a prior litigation.

Q. Was that in the smoking or in the benzene case?

A. It was a benzene case.

Q. Were you asked questions about this under oath?

A. I was. Well, no. All I was asked was it was red, did I read it correctly, and there were no questions, as far as I remember.

Q. And this again is from Dr. Schnatter, as you mentioned, potentially a PowerPoint of some kind, correct?

MR. TUBIN: Objection to foundation.

A. Presumably this is his PowerPoint -- you never know -- but his name is on the front page.

BY MR. TELAN:

Q. And under "Background," it says, "Describe the significant issues of concern to global

petroleum industry that the research would affect."

Did I read that correctly?

A. Yes.

Q. Then he speaks about the "health effects of ambient air concentrations" and the current drive "calling for the reformulation of ... gasoline, which would have massive financial impacts on petroleum refiners."

Did I read that correctly?

A. Yes.

Q. So, again, Dr. Schnatter is mentioning the fact that the expected health effects and the drive would have an impact on finances. True?

MR. TUBIN: Objection to form and foundation.

A. So, first of all, there's no "again," because we went to the other document and showed that it wasn't a Schnatter document. Secondly here, Schnatter has his name on it. We may or may not assume that he's the one who put these slides together or were showing them.

BY MR. TELAN:

Q. Okay. And in the second bullet point, the thought is they're speaking about the impacts of controlling emissions; is that right?

MR. TUBIN: Objection to form.

A. That's right.

BY MR. TELAN:

Q. And in the third point, they're talking about the cleanup of contaminated soil and water from benzene, correct?

A. Correct.

Q. And then the last point, they're talking about, as a significant issue of concern, to the global petroleum industry, the "Litigation alleging induction of various forms of leukemia and other hematopoietic diseases from exposure to petroleum-derived benzene result in millions of dollars in expenses to the industry."

Did I read that correctly?

MR. TUBIN: Objection to form.

A. You did read it correctly.

BY MR. TELAN:

Q. Do you find that odd at all that a scientist is talking about litigation costs as it relates to the impact of the scientific research on industry?

MR. TUBIN: Objection.

A. Again, I don't know what scientists do within industry, and I also don't know that this is

his slide or written for him or his presentation.
BY MR. TELAN:
Q. Under "Project Value," the next page, what is the title of that heading, if you would read that in, please.
A. "Project Value" underlined. "How will research results enhance industry's ability to achieve objectives on issue of global impact and concern," colon.
Q. And what is the first bullet?
A. "Provide strong scientific support for the lack of a risk of leukemia or other hematological disease at current ambient benzene concentrations to the general population."
Q. And the second one?
A. "Establish that adherence to current occupational exposure limits (in the range of 1 to 5 ppm) do not create a significant risk to workers exposed to benzene."
Q. And then the third one?
A. "Refute the allegation that non-Hodgkin's lymphoma can be induced by benzene exposure."
Q. And you don't believe that benzene can cause NHL, do you?

A. We've talked about that before. At the current time, there's insufficient evidence to make that causal conclusion.

Q. And when you say "there's insufficient evidence," you're speaking for your evaluation of the evidence, correct?

A. Well, not only me, but for human evidence, as both my independent evaluation but, also, IARC's evaluation as of 2018.

Q. Incidentally, in the Bradford Hill considerations, one of the elements is consistency, correct?

A. Correct.

Q. How is consistency defined?

A. Consistency is defined as common results among different studies, different populations, different methodology, period.

Q. Quantitatively, what does that mean?

A. There's no quantitative value to that.

Q. So qualitatively, what does that mean?

A. Well, it's an evaluation of the data, what the risk estimates are, what the confidence intervals are. Among those studies, what the dose-response relationships are. And as you look at high quality studies versus low quality studies, do

you start to see similar statistically significant results among the higher quality studies, such as you do, for example, benzene and AML would be a great example of that.

Q. If there hypothetically are an equal balance of high quality studies on either side of the null value, is consistency achieved under a Bradford Hill evaluation?

A. So I've been asked those types of questions before, and it was sort of like 50 percent or 60 percent or 70 percent, and we don't -- it's not a soccer match, so we don't subscribe the number one way or another, and high quality is not all the same. Some studies, you can have a case-controlled study that's high quality and a cohort study that's high quality, but you will rank the high quality cohort study over the case-controlled study, and you look and see whether there are consistent results of one versus the other.

Q. Can you meet consistency with less than 50 percent?

A. So it depends on the denominator and what types of studies you're putting into the pool to weigh the evidence. So, again, it's the highest quality studies defined as the best methodologies, the

best statistical analysis, the success of the methodologies. You know, do they really ascertain the cohorts and that sort of thing, along with the quality of the exposure assessment, because if you have a low quality exposure assessment but everything else is high quality, that's gonna end up with a lower weight.

So, again, you can't come up with numbers of papers. I guess the answer is, as a hypothetical, maybe, but as we sit here today for the Camp Lejeune studies, we only have that for benzene and AML and, arguably, the TCE and kidney cancer.

Q. I suppose you would agree that medicine is not an exact science, correct?

A. That's a pretty broad statement. So it's not always exact, and sometimes it is exact.

Q. So maybe rephrase it.

Medicine is part art and part science?

MR. TUBIN: Objection to form.

A. In many cases, that is true. Sometimes it's all science. Sometimes it's probably more art.

BY MR. TELAN:

Q. And a lot of times, the art is done at bedside by somebody who's exercising clinical judgment in a particular situation?

MR. TUBIN: Objection to form.

A. Sure. But now we're not talking about sufficient human evidence in epidemiology. We're talking about an individual practitioner making a decision or recommendation about a patient.

BY MR. TELAN:

Q. But judging the quality of studies is, to some degree, subjective, correct?

MR. TUBIN: Objection to form.

A. It can be subjective, but it has to be laid out in a transparent manner so that people could see what the other person is doing and so that you're gonna agree to disagree, but it's got to be transparent.

BY MR. TELAN:

Q. But you would say that the more studies that exist that favor a particular result, the more likely it is that you can achieve consistency, correct?

A. All things being equal, which really it is, that would be correct.

Q. And folks like Schnatter and Irons and Wong know that as well, don't they?

MR. TUBIN: Objection to form.

A. I would hope so.

BY MR. TELAN:

Q. So flooding the industry with science would certainly -- let me ask you this. Have you done any analysis to see whether industry-funded science is more likely to result in favorable results to the industry?

A. I have not done that analysis.

Q. Have you seen any studies that look at that?

A. I have seen opinions that that is the case. I'm not sure I've seen the data either way, and that's a pretty hard thing to actually study, I would think.

Q. If we go back to Exhibit 13, at the very bottom of 44376, it says, "Primary participants include," and then if you go to the top of the next page, do you see the folks listed there under "Epidemiology," Dr. Wong, Dr. Schnatter and Dr. Fu?

A. Yes, I see that.

Q. And, again, the project cost at the bottom is essentially what it was previously, and there's discussion, albeit brief, about how much it would cost in the first year to fund laboratory facilities in Shanghai. Do you see that?

A. Yes.

Q. Have you gone back to check to see how many times you cited to Wong, Schnatter and Irons in your report?

A. I'm not -- the answer is no. I don't know why I would do that, but I cited their studies among, boy, I don't know, maybe 60 other studies, and I don't consider their studies among the highest quality studies, like we get from NCI, the Australian cohort, or the Pliofilm cohort, because I don't know what the point is for me to see how often I cited them.

MR. TELAN: Let's go to the next exhibit.

COURT REPORTER: Fourteen?

MR. TELAN: This is 14, yes.

(Exhibit 14 was marked for identification.)

BY MR. TELAN:

Q. By the way, have you read all of the articles that you cited in your report?

A. Sure.

Q. Did you read them all for this, for preparing your report?

A. No.

Q. You've read those, I've been guessing,

over years?

A. Many times.

Q. You had mentioned that you had searched terms that would cue you in, in the event that a relevant article popped up, right?

A. Correct.

Q. But they weren't -- they weren't enough to find Goodman's articles that we talked about. True?

MR. TUBIN: Objection to form.

A. Boy, I don't know how to answer that, because Goodman's articles are totally irrelevant to the types of searches. I mentioned before I didn't search on the term "equipoise" in PubMed, but I did for "likely as not" and found nothing for "as likely as not," whether there's "more" or "as."

BY MR. TELAN:

Q. Did her articles you recall talk about at least as likely as not?

A. We have to go back to the three of them. I don't think so. I think it was equipoise.

Q. How do you --

A. Let me just state, so you understand how PubMed works, it doesn't search the articles. It searches the abstract of which mentioned equipoise in

the abstract. It searches the keywords and the titles.

Q. I see. Were all your searches done on PubMed?

A. Yes.

Q. Okay.

A. So if someone has a paper where, in the discussion, they put in "as likely as not," I would not capture that.

Q. Understood. Okay.

Let's go to 14. You see at the bottom, it's got a date of April 18th, 2007, and the title of "Risk Management"?

A. Yes.

Q. Under "Overall Issue Goals: API supports the use of sound science in key risk assessments for health and environmental rulemaking decisions. API's risk management programs develop scientific data for key issues across environmental media for use in science advocacy, risk management, litigation support, and risk communication."

These pro -- I'm sorry. "The programs are designed to minimize excessively conservative legislation and regulation affecting upstream and downstream petroleum operations."

Did I read that correctly?

A. Yes.

Q. How does one design an epidemiological study to minimize excessively conservative legislation?

MR. TUBIN: Objection to form.

A. I don't see where you're getting from this that they're saying they're developing an epidemiological study to minimize excessively conservative legislation.

BY MR. TELAN:

Q. What do you think they're talking about when they say "programs"?

MR. TUBIN: Objection to form.

A. Developing key scientific data. So what they're saying is we're going to develop data so that decisions can be made from a risk-management perspective for legislation and regulation based on data and not defaulting to what would be common practice as the precautionary principle.

BY MR. TELAN:

Q. And do you see under "Situation Analysis," the first bullet point, the statement is that "Benzene continues to be of particular concern to the industry, due to its classification as a known

human carcinogen"?

A. Sure, as it should be.

Q. And then in the paragraph underneath the bullet points, "Use of scientifically sound peer-reviewed studies from the published literature and the development of new data are needed to support science advocacy, provide sound risk management, support litigation, communicate with the public, respond to congressional inquiries and any other arenas, domestic and abroad."

Did I read that correctly?

A. That's right.

Q. If we go to the next page under "Programs," does it state that the "Projects in the American Petroleum Institute risk management program are managed by either American Petroleum Institute Toxicology or Benzene Task Force"?

A. That's what it says.

Q. And then underneath it, under "Product and Compound Risk Management," does it state that "projects are designed to provide a scientific basis for balanced, protective legislation, regulation and exposure standards that appropriately address and manage risks posed by industry operations"?

Did I read that correctly?

A. Yes.

Q. And "By using published scientific data and by developing new scientific evidence where needed, API hopes to demonstrate that the existing controls on regulated petroleum products, hydrocarbon components and related compounds are sufficient, and additional regulatory or standard-setting actions will not provide further health or environmental benefits."

Did I read that correctly as well?

A. You did.

Q. And then under "Proposed Projects," there are eight of them going on to the next page. Do you see that?

A. Yes.

Q. And number 7 is the "Re-examination of the Pliofilm cohort data." Do you see that?

A. Yes.

Q. And the API was going to support a re-examination of the worker data "in light of current regulatory trends and recent publications that report low-dose effects." Correct?

MR. TUBIN: Objection to form and foundation.

A. You read that correctly.

BY MR. TELAN:

Q. What do you think they're saying there?

MR. TUBIN: Objection to form.

A. What they're saying and I believe what they did was getting the Pliofilm cohort data and, in their minds, doing better modeling to try to understand the levels of exposure of the Pliofilm cohort that measurably increases the risk of, and that study was all leukemias combined, but I think they also tried for AML as well.

BY MR. TELAN:

Q. And do you know if the American Petroleum Institute achieved that goal of doing that?

A. I believe they have a publication. There's been several groups that have gotten the Pliofilm data by Crump, and I think Paxton was another one, but they're cited in my report. There's two or three papers that re-examine the Pliofilm worker cohort. And just to be clear, I've cited those in my report, but I haven't relied on them. I go back to the actual publication by Rinski in 2002 as being the most informative.

Q. I'm going to hand you the next exhibit. This is 15.

(Exhibit 15 was marked for

identification.)

BY MR. TELAN:

Q. Is this a document that you recognize?

A. Yes.

Q. So API hired Gradient to do this, didn't they?

A. They did.

Q. And Dr. Goodman, correct?

A. As the second author. That's correct.

Q. And Dr. Goodman is an expert in this case, obviously. True?

A. That's right.

Q. The date of this article is 2016, correct?

A. That's right.

Q. And do you cite to this paper in your report?

A. Yes, I have.

Q. And the American Petroleum Institute actually funded this study, correct?

A. That's what the footnotes say.

Q. Do you know if Gradient has a contract with the American Petroleum Institute?

A. I don't know that either way.

Q. Does it matter to you or no?

A. It would be something that I would consider. They're doing a reanalysis of the cohort data, and they found exactly the same things that Rinski and others have published. So the funding of this paper in particular wouldn't matter, but it wasn't one that I relied on heavily either way.

Q. Do you know what information, if any, was conveyed by members of the benzene task force to the Gradient folks who ran this paper in advance of the study?

A. If it's not in the introduction discussion, I wouldn't know that at all, and I'd have to read the introduction discussion to see if it's mentioned.

Q. As we're looking for the next numbered exhibit, when you use the term "probable," does that convey a likelihood of greater than 50 percent?

A. As I mentioned before, none of this is quantitative from a scientific perspective.

Q. I'm talking about everyday vernacular. If you say something is probable, do you interpret that to mean that there's a greater than 5O percent chance of something occurring?

A. It could be less. It could be more. I guess it depends on the context. I'm not sure how to

answer that overly poor question.

Q. Do you think probability would allow for a definition under 50 percent?

MR. TUBIN: Objection to form.

A. You know, I think I'm probably gonna win the lottery. I don't get there, but I will say to my friends I am probably going to win the lottery. That's a lot less than 50 percent.

BY MR. TELAN:

Q. I'll probably bet your possibly going to win the lottery. We might disagree.

A. Definitely maybe.

Q. So in terms of possibility versus probability, what quantifiably has a more likelihood of occurring?

MR. TUBIN: Objection to form.

A. I don't have an answer to that. I think it will depend on the context, but I'm not even sure where to go with that.

BY MR. TELAN:

Q. Do you consider the terminology at least "as likely as not" to be synonymous with "more likely than not"?

MR. TUBIN: Objection to form.

A. As -- it's not used in my everyday

language. As used here, I think they are different. "As likely as not" then would mean a 50-50 flipped coin, and "more likely than not," as used in this litigation by your experts, would be more than a 50-50 flipped coin.

BY MR. TELAN:

Q. Did you cite in your paper to an article by Dr. Schnatter and a scientist named Win Chow Li? The title is "Benzene risk assessment. Does new evidence on myelodysplastic syndrome justify a new approach?"

A. Yes, I did.

Q. And what did you cite that paper for? What was the proposition that you cited that for?

A. So, in part, it's here to be comprehensive, but I was commenting on this concept of this new approach was that they were trying to argue that all levels of exposure, all durations of exposure be considered for modeling risks, which is the case. I thought they were trying to negate this concept of what has been reproduced in multiple high quality epi studies for the etiologic time window, the time since last exposure, the development of AML being for 10 to 15 years.

And I think they were trying to say for

an epidemiologic purpose, we should be going past 15 years, and it was both nonconvincing. And given all the documents we went through, it would be actually anti-industry position, even though that's Dr. Schnatter.

Q. Do you know if the benzene task force expanded its reach into Europe?

A. I don't even know whether they started or not started in Europe or Africa or expanded their reach. I don't really know much about them offhand.

Q. You did see, though, that they had connections that they spoke about in China, in Shanghai, correct?

A. Well, that's where they were doing the study. They were going to where the highest exposed benzene workers were in the world and that were accessible for research studies.

Q. Does the name "Colin North" ring a bell to you?

A. Only as an author in some of the papers I cited or maybe just one. I don't know.

Q. What about Rushton?

A. Rushton also has been cited. Several of my -- several of his papers over many years have been cited in my report.

Q. And he's also an ExxonMobil employee. Did you know that?

MR. TUBIN: Objection to form.

A. I'd have to go back and check. I think that's the case.

BY MR. TELAN:

Q. If you go to --

A. So I actually don't believe that is correct, because his affiliation, as of 2013, was the Imperial College of London, Department of Epidemiology and Biostatistics. He published with Schnatter, who is from ExxonMobil and, in this case, of this paper that I'm citing, acute myeloid and chronic lymphoid leukemia and exposure to low-level benzene among petroleum workers. The third author was Deborah Glass, who was from the Monash University in Australia. So I don't think it's not correct that he, at least at the time of this publication, was working for --

Q. You're right. I stand corrected. Schnatter was the second author on that, and he's with ExxonMobil?

A. Correct. He always has been, as far as I recall.

Q. And that study, that was at page 104 of

your report, I believe; is that correct?

A. I think I cited it in multiple places. I'm looking -- the one I'm looking at is on page 131, but I think It's cited several times.

Q. And what do you say about that paper at page 104 of your report? This is the article. I'll hand that to you. We'll mark that as the next number exhibit. If it helps, Dr. Shields, I have a paper copy for you.

A. No. I already have the article. I'm trying to figure out where you're seeing that on page 104.

Q. I thought it was page 104. Is it cite 635? It's also page 106 and 110.

A. Yes. So it's cite 635, and what it says -- what it's citing for on page 104 is it's one of five cites grouped together, and it says, "Another series of studies frequently cited for benzene risk in AML are from the Health Watch, Australian Health Watch Study of Refinery Workers. They indicated risk increases of 8 to 10 PPMU's, although a reanalysis, as part of a pool study of several refineries, did not find an increased AML risk but did report an increased MDS risk at lower levels where AML was not observed. See below." And this Rushton paper is one of those I

recited.

Q. Okay. Do you know if Rushton receives funding from the European chemical industry?

(Exhibit 16 was marked for identification.)

A. So under, in that paper that we're talking about, under "Conflict of Interest," it says, "Leslie Rushton receives funding for board membership at the European Center for Ecotoxicology and Toxicology of Chemicals from the European Chemical Industry Council via Imperial College for Projected Work. So that's basically his salary is getting funded through his university, as part of his university job.

BY MR. TELAN:

Q. Through which industry?

A. Well, it says it's going to his board membership in the European Center for Ecotoxicology and Toxicology of Chemicals and from the European Chemical Industry Council via Imperial College for Project Work.

Q. Now, this is a 2014 publication, correct?

A. Unless we're looking at different ones, I have 2013.

Q. Okay. And the conclusion of the article is that, "Overall, this study does not persuasively demonstrate a risk between benzene and AML." Do you see that, the abstract? It might be easier just to look at the hard copy.

A. Actually, it's much easier and this is much quicker, and this is why you want me to have a laptop. You can do you and I can do me, but I'm telling you that this is more efficient for you.

So in this paper, just as in the previous Schnatter 2012 paper or another Rushton paper, they oddly did not find a relationship between benzene exposure and AML, but they did report a strong relationship between MDS and AML, and that's what is reported in this paper as well.

Q. And there's no doubt in your mind that benzene does cause AML, correct?

MR. TUBIN: Objection to form.

A. Yes, that's correct. That's one of the oddities of these studies that Schnatter and others have published where they claim an association of benzene exposure 2.9 ppm years is associated with MDS, but they found no AML. And what likely happened is when they went to define the diseases, they redefined the AMLs and MDS when they shouldn't have and so is a

problem as I go into detail in my report. But that's what these folks, including Schnatter, who's working at Exxon, put on the map for benzene causing MDS at low levels of exposure.

Q. And not AML?

A. And not AML, which is problematic for them. I can tell you their theories in the papers, but it doesn't hold water.

Q. If you look at the Table 1 from that study, if you go over on the chronic CLL lymphoid leukemia, and just let me know when you're there.

A. Yeah. I'm there.

Q. Okay. Do you see that both of the risk ratios are above one as reported?

A. For?

Q. For CLL.

A. Yeah, but there's a lot of risk ratios here. Many of them are below one. Like the average benzene exposure intensity --

Q. I'm looking just at cumulative benzene exposure. Do you see that?

A. Okay. Yes. So one of them is at 1.05 at the highest level of exposure, and the middle of the level of exposure is 1.49, which is numerically higher than the 1.05.

Q. So you would say that these results, as it relates to CLL, are not statistically significant?

A. They are definitely not statistically significant, and they're showing in a not-tested-but-inverse-dose response.

Q. Do you think it would be appropriate if you look at the mid-level exposure range of .348 to 2.93 to interpret the risk ratio, confidence interval to state that the dataset parameter values are consistent with values that range from below the no value to a risk that approaches three times the risk for chronic lymphoid leukemia?

MR. TUBIN: Objection to form.

A. To be clear, for that middle-level exposure, it goes from 0.81 to 2.76.

BY MR. TELAN:

Q. So is my question, the way I asked it, is that, would you agree with that or not?

A. Do you want to say the question again, because I was giving you the actual data rather than trying to reword their data.

Q. Yes. Would you agree that you could interpret that confidence interval by saying that the dataset includes values below the no value to parameter values that approach 270 percent risk for

chronic lymphoid leukemia?

MR. TUBIN: Objection to form.

A. Yes. Anywhere from a 20 percent increased risk to a 270 percent increased risk.

BY MR. TELAN:

Q. Okay. If we go to the Colin -- did you cite to Colin North in your paper as well, did you say?

A. Yes.

Q. Okay. Did you say --

A. He's got several papers, and I believe I've cited some of the papers.

Q. And you knew that he was also ExxonMobil or did you not?

A. He is ExxonMobil along with Schnatter.

Q. You don't say that again in your report anywhere, right? Like, that's not something that you actually overtly stated?

A. As I said, I considered that. None of these papers I considered the high quality driving the opinions I have, but I don't routinely put in what the funding agency was.

Q. Okay.

A. Of any type, whether it's university or federal government or industry.

Q. James Collins is another author that you cited to. Do you know Dr. Collins?
A. Personally? No.
Q. Do you know of him?
A. Again, as an author.
Q. Do you know if he's an industry author or not?
MR. TUBIN: Objection. Form.
A. It looks like Dr. Collins is from Dow Chemical.
BY MR. TELAN:
Q. So he would be an industry author, correct?
MR. TUBIN: Objection to form.
A. Correct.
BY MR. TELAN:
Q. Do you know if Dow is part of the benzene task force?
A. No idea.
Q. You don't know or you do know?
A. No. I have no idea.
Q. Okay. The concept of risk assessment, you agree that that's not something that should be used in determining causality. True?
A. I'm trying to think how it's not used

and not just what I believe. I mean, risk assessment is part of the hazard identification. Causation is -- the first part is whether or not something causes cancer and at what level. Then that gets turned over to folks like the risk assessors and that sort of thing to figure out the model's risk in the population.

Q. And you'd never use that to evaluate individual causality, correct?

A. If you're asking me if someone does a computer model that says this level of exposure will increase three cancers in a million, would I ever use that to say that that's a person's actual risk? The answer is no.

Q. Okay. Let's me hand you what we'll mark as the next numbered exhibit.

(Exhibit 17 was marked for identification.)

BY MR. TELAN:

Q. I believe you cited to this. This is the -- a Schnatter paper. And you see it's -- you have Richard Irons and Lesley Rushton there as well?

A. Yes.

Q. And have we established that those are all industry scientists?

MR. TUBIN: Objection to form.

A. Yes. Let me go back and look one more time.

BY MR. TELAN:

Q. If you look at the paper, they're all ExxonMobil.

A. No, that's not correct.

Q. I'm sorry. It is says Schnatter, ExxonMobil.

What about Richard Irons?

A. Richard Irons, I believe, is the University of California. Let me look. So you have Richard Irons is from ExxonMobil.

The next author is Deborah Glass. We just went through this, is at Monash University in Australia. G.T. is Gong Tang, who is from the University of Pittsburgh. And then Richard Irons is from the University of Colorado. And then last, Lesley Rushton, as we established, is from the Imperial College of London.

Q. Okay. If we look at this particular study, you do note that Richard Irons is the same scientist who was involved in the Shanghai study that was mentioned in the benzene task force memos, correct?

MR. TUBIN: Objection.

A. That's correct. That's correct.

BY MR. TELAN:

Q. If you look at Figure 2, and this the forest plot, if you go to page 1728, "Cumulative Exposure."

A. Yes, I'm there.

Q. Are you there?

A. Yep.

Q. Does that meet consistency under a Bradford Hill analysis?

A. I'm not sure how to answer that, because consistency is across papers. It is not a thing -- for Bradford Hill concepts for consistency within a paper, you do look at the consistency of the results within a paper, but that's different than the Bradford Hill context.

Q. All of the results in this paper show that cumulative exposures at low to high levels have an increased risk of above null, correct, for AML. True?

A. No, absolutely not.

Q. Okay. So what do you see for AML under -- on page 1728?

A. That all the results are statistically

insignificant. They all drop the lower confidence level below one.

Q. What about the relative risk ratio, setting aside the confidence interval for a minute?

A. If you're asking me whether it's numerically increased above one, sure. It's not meaningful, but it's numerically increased.

Q. For every single disease, correct?

A. That's correct.

Q. And you would just say that that, because the statistical, the confidence intervals include one, that the results are meaningless, correct?

MR. TUBIN: Objection to form.

A. Boy, there's so many different, different contexts to that.

So, first of all, these are all different diseases, so it's not appropriate to just say gee across all of them. They're numerically increased above one.

Secondly, they're giving you data for dose response, and you can see things like, for CLL, it decreases at the highest level, and CML, it decreases at the highest level. So the data is really all over the place.

But with the exception of MDS for greater than 2.93 ppm years, all of these are not statistically increased, and the true result could either be below one, up to and including above one.

BY MR. TELAN:

Q. So the conclusions from the authors were that relatively low exposure to benzene by the petroleum workers was associated with an increased risk of MDS but not AML, which was similar to the paper we had chatted about before from Dr. Schnatter, correct?

A. Yes. Which, as I said before, is -- I think they have some important methodological issues, and it's not just me, because they should have seen an increase in AML, but what they novelly reported here was the increase in MDS at the lowest levels of exposure, even below those commonly associated with AML.

Q. Let's go to the next numbered exhibit.

(Exhibit 18 was marked for identification.)

A. Yes.

BY MR. TELAN:

Q. This is from James Collins, who I think you had mentioned was a Dow employee?

A. That's correct.
Q. And this is benzene study looking at lymphatic and hematopoietic cancers, correct?
A. Correct.
Q. Under the first paragraph, Dr. Collins says, "The Pliofilm rubber worker study has been seminal in helping to set exposure standards for benzene, including U.S. EPA's cancer potency factor" as well as "the Occupational Safety and Health Administration's ... exposure limit and the ACGIH proposed threshold limit values."
Do you see that? It's on page 1, first paragraph.
Dr. Collins goes on to state that --
A. I'm still trying to find that.
Q. See, if you looked at the paper one, it'd be quicker.
A. No. It's bigger here and it's easier here, and I can search for keywords. I still don't see where you're reading here.
Q. Can I just point? It's the first paragraph.
A. Okay.
Q. Go ahead. Paper might be better. I'm just saying.

Does Dr. Collins go on to say, "Other leukemias and lymphoid neoplasms have also been reported to be associated with benzene exposures in some studies"?

A. That's right.

Q. And then, underneath that, "Recently, myelodysplastic syndrome," which is something we've just chatted about, "has been observed in an epidemiology study at relatively low benzene exposure levels. Myelodysplastic syndrome is a disease of the blood-forming tissue in the bone marrow and sometimes precedes acute nonlymphocytic leukemia." Is that correct?

A. That's what they wrote.

Q. Okay. And this study was funded and performed while Dr. Collins was still at the Dow Chemical Company, correct?

MR. TUBIN: Objection to form.

A. I assume that that is correct. Actually, it states that explicitly.

BY MR. TELAN:

Q. If you go to the very last page toward the bottom, underneath the tables, there's a conc -- the sentence starts, "For cancers of lymphatic and hematopoietic tissue among all workers." Do you see

that?

A. In the discussion?

Q. It's on page 160. I apologize.

A. 160. And what were the beginning words?

Q. "For cancers of the lymphatic and hematopoietic tissue among all workers."

A. Okay. I've got that.

Q. Okay. If you look across the relative risk ratios, can we agree that, setting aside the confidence intervals for a minute, all of the risk ratios reported by Dr. Collins in this are above the null value?

A. I'm not sure how to answer that, but I think what you wanted to ask me was whether they are all numerically above one, and the answer is yes.

Q. Yes. And then all of the risk, the confidence intervals include the null value?

A. Correct. They all drop above and below one.

Q. And the conclusion from Dr. Collins, back on page 1, is "Our results for all leukemias are consistent with a small increase in risk observed in the lower-exposed subgroups of the Pliofilm study. However, our results are also consistent with no

increased risk, especially for acute nonlymphocytic leukemia."

Do you see that?

A. That's correct.

Q. Do you agree with that conclusion?

A. Well, it depends on how you want to define "small increase in risk," because if you want to say small increase in risk without statistical significance, then I would agree with that, and in this study, they don't have an increased risk for acute nonlymphocytic leukemia.

Q. Yes. Other than for acute nonlymphocytic leukemia, would you agree that this study is consistent with a small increase in risk across all other leukemias?

A. No, because they're not statistically significant.

Q. So you disagree with his conclusion?

A. Well, they don't define whether they have statistical significance or not. If they did, then that would be clear. So it's ambiguous, but their results are their results from the paper, which is a numerical increase in risk without statistical significance.

Q. Did you know that Dr. Collins is the

director -- or was at the time the director of epidemiology at the Dow Chemical Company?

A. I don't know that.

Q. Presumably, he would understand the concept of statistical significance, correct?

MR. TUBIN: Objection to form.

A. That's right.

BY MR. TELAN:

Q. And he chose the words and did not include statistical significance in that conclusion, correct?

MR. TUBIN: Objection to form.

A. No. He didn't need that, because he has that in the results. You can see that the results are not statistically significant.

BY MR. TELAN:

Q. So is his conclusion accurate?

A. It's accurate for a numerical increase without statistical significance, which is clear from the results section.

MR. TELAN: Okay. How are we doing -- how are you doing on --

THE WITNESS: If this is a good time to break, we can take another five minutes?

MR. TELAN: Yeah.

VIDEOGRAPHER: We are now going off record. The time is 3:50.

(A recess was taken from 3:50 to 4:05.)

VIDEOGRAPHER: We are now back on the record. The time is 4:05. You may continue.

BY MR. TELAN:

Q. Dr. Shields, you reviewed the Cohn Ecological Study, correct?

A. Correct.

Q. Did you make a comments in your report about the quality of that study?

A. Likely.

MR. TELAN: Mark this as the next numbered exhibit.

(Exhibit 19 was marked for identification.)

BY MR. TELAN:

Q. This is an article from, again, Julie Goodman at Gradient, right?

A. Yes. That's what you handed me.

Q. In fact, all of the authors are from Gradient?

MR. TUBIN: Objection to form.

A. It appears so.

BY MR. TELAN:

Q. If you go to page 7 of that study, this is an article looking at PCE and NHL, correct?

A. Yes.

Q. The first paragraph, it says, "Three ecological studies examining the potential associations between PCE exposure and NHL were identified. As shown in Table 4, all of the ecological studies are low quality with respect to study design, exposure measurements, exposure levels and confounders, with one exception: Cohn, et al."

Do you see that?

A. I'm sorry. So you said on page 7?

Q. Page 7 of "Ecological studies."

A. Oh, okay.

Q. Do you see what I was referring to?

A. Yes.

Q. And if you go to cite number 24 at the back, I want you to confirm that Cohn study that she's referring to is the ecological study evaluating drinking water contamination and the incidence of leukemia and non-Hodgkin's lymphoma.

A. Okay.

Q. Is that true?

A. Yes.

Q. What was your comment about the study?
A. So as an ecological study compared to high quality studies we have for PCE and NHL, it's a low quality study. As an ecological study compared to the other ecological studies, which overall are given low weight, it's an okay paper. I don't think it's a high quality ecological study.
Q. So it's certainly not low quality, correct, as far as ecological studies go?
A. It's not as bad as the other ones, but that's not comparing much to much.
Q. Okay. You wouldn't tell the judge in this case that it was a poorly designed or poorly run study, correct?
A. That's a two-part thing. I'd have to think about the poorly run. The design is what it is. It's a low informative study. They don't have individual exposures, which would, which separates an ecological study from a higher quality nonecological study.
Q. And you do note at page 8, Dr. Goodman refers to the fact that the Cohn study revealed increased risks of non-Hodgkin's lymphoma in males at PCE concentrations from .1 to 5 parts per billion with a risk ratio of 1.25 and a confidence interval that

goes from 1.07 to 1.46, correct?

MR. TUBIN: Objection to form.

A. Yes. At the lower level of exposure, they had a statistically significant result but not in those with high levels of exposure or in women in any level of exposures, so if she's recording that accurately.

(Exhibit 20 was marked for identification.)

BY MR. TELAN:

Q. If we go to a study by Mundt, does that ring a bell with you? M-u-n-d-t, K. A. Mundt?

A. The author is familiar to me. I'm not sure I'm familiar with the paper itself.

Q. Did you cite that paper in your report? Look at page 94.

A. Yes. It is citation 498. Do you have a page number?

Q. Is it cite 498 at page 94?

A. Yes.

Q. Okay. And are you familiar with Randoll Corporation -- Ramboll Corporation?

A. Where are you seeing that?

Q. Page 19 of 22. "This research was" funded or "sponsored in part by a grant to Ramboll

U.S. Corporation from the Foundation for Chemistry Research and Initiatives."

A. I'm not familiar with them.

Q. In any event, Dr. Mundt was looking at literature related to four different chemicals, correct? Benzene, formaldehyde, 1,3-butadiene and smoking. True?

A. Yeah. I wouldn't call tobacco smoking a chemical agent, but, yes, those are the four exposures they're looking at.

Q. And I didn't call it that. That's his words, right?

A. That's correct.

Q. Okay. If you go to page 8, if you see at the bottom, the second paragraph from the bottom, starting with "Since studies," do you see that?

A. Yes.

Q. "The meta-analysis of results for AML was based on 27 estimates from 26 publications and generated a summary relative risk of 1.3 with a confidence interval that was 1.09 to 1.55."

Do you see that?

A. Yes.

Q. Does that indicate elevated risk that is statistically significant, in your words?

A. The risk estimate would be statistically significant.

Q. And then, below that, "For CML," the paragraph below, "the meta-analysis of overall results was based on 18 estimates ... in a summary risk of 1.25 with a confidence interval from 1.00 to 1.55." How would you describe that confidence interval?

MR. TUBIN: Objection to form.

A. I think the convention is to call it borderline statistically significant.

BY MR. TELAN:

Q. You wouldn't call it null, correct?

A. No. I would call it borderline statistically significant.

Q. Would it be inappropriate to call a study that revealed a positive association but where the confidence interval included the null value to simply refer to it as a null study?

A. You're saying that the lower confidence interval was one?

Q. It was below one, hypothetically.

A. You know, this is all a spectrum. If it was .99, I'd probably still call it borderline significant or even .98, but it would also depend on the context, and as important would be what is the

other data in the study rather than cherry-picking one result.

Q. I'm asking you hypothetically if the study revealed a relative risk that was positive, let's say 1.3, but the risk ratio -- I'm sorry, but the confidence interval went from 1.7 to 2.4. Would it be appropriate to refer to that as a null study?

A. Yes. But most studies also have multiple results. So let's assume that there's multiple analyses all with that type of result, and that would be a null study.

Q. If you look at the -- what is the significance when Dr. Mundt states that "Publication bias appears unlikely"?

A. What is the significance?

Q. Yeah.

A. So there are procedures to try to predict whether there's publication bias or not. They're actually not very good, but it's as good as they get, and so they do these final plots and try to see whether or not there's some results that are skewed.

Another way to look at it is the heterogeneity of the results. That's what you do. But at the end of the day, you can't really know

whether you have publication bias or not, because you don't know what didn't get submitted, so they try to guesstimate whether that's an issue or not.

Q. If we go to page 94 of your report --

A. And let me -- I'm just sorry. So you were reading the first half of that paragraph about "publication by a superior is unlikely." Oh, then they go on for --

Q. Yeah.

A. -- "myeloid leukemias combined." Okay.

Q. I was going to ask you when they combine the myeloids together, both CML and AML, the confidence interval becomes statistically significant, does it not?

A. Yes, with evidence of publication bias.

Q. In your report, do you mention any of those relative risk ratios that we just talked about?

You note that, under "Cigarette Smoking," that "a Bradford Hill analysis indicates that cigarette smoking is causally related to AML" but nothing more for that particular study there, correct?

A. On that page. I'm looking to see whether I've cited it elsewhere in my report. That looks like it's the only place where it's cited.

Q. Why didn't you cite the relative risks

related to CML?

A. For smoking?

Q. For benzene.

A. I have no particular reason why I didn't.

Q. If you go to the page 8 of 22, Dr. Mundt states, "The meta-analysis for MDS generated a summary risk of 1.87 with a confident interval of 1.39 to 2.52."

What is the significance of that result?

A. That doesn't get any summary estimate that's statistically significant.

Q. And this is for benzene, correct? All the results we're talking about are for benzene if you look at page 5 of 22, correct?

A. That's correct.

Q. And you only cited in the study to suggest that cigarette smoking was related to AML?

A. That's right. I didn't cite this anywhere else.

Q. But, in fact, this study is consistent with elevations and risks from benzene alone for MDS, AML and CML, correct?

MR. TUBIN: Objection to form.

A. Well, so I've -- what's indicated in my report is that I believe that benzene is the cause of MDS and AML, and rather than citing all meta-analyses, I cited some. But, more importantly, I cited the actual papers. I look at benzene and CML.

BY MR. TELAN:

Q. Does MDS frequently become AML?

MR. TUBIN: Objection to form.

A. About 30 percent of the time, it transforms. They always start off as a different disease, but in some cases, MDS will evolve into an AML.

BY MR. TELAN:

Q. And so you would agree that the studies that you've reviewed and cited to demonstrate that benzene does, in fact, target the bone marrow as a target tissue, correct?

A. Yes, for MDS and AML. Correct.

Q. And benzene's metabolites are both genotoxic and mutagenic, correct?

A. I think that's the same thing.

Q. Is it?

A. Genotoxic is mutagenicity. Mutagenicity is a genotoxic effect.

Q. Are all genotoxic substances mutagenic?

A. Not necessarily.
Q. Are all mutagenic substances genotoxic?
A. By definition, yes.
Q. So they're not apples to apples, correct?
A. Well, you can measure genotoxicity, for example, a DNA adduct that's not a mutation, but that DNA adduct can transform during replication into a mutation.
Q. But benzene is both? The metabolites are both genotoxic and mutagenic, correct?
A. I have to go back for mutagenic. It's clastogenic that causes chromosome damage. I think it does cause mutagenics -- mutagenicity, but I have to go back to my leukemogenesis section to confirm that.
Q. Does benzene create DNA adducts, the metabolites?
A. Yes.
Q. Is benzene also immunotoxic?
A. Yes.
Q. Is TCE and its metabolites genotoxic?
A. I think that's debated. My understanding is that it is, but I have not really looked into that closely to remember that either way.
Q. What about immunotoxic?

A. It does have some immune system effects.

Q. And as far as the folks who were at Camp Lejeune are concerned, when they were exposed to the water that was distributed through the Hadnot Point Water Treatment Distribution System, they were exposed to a multitude of chemicals, not just a single carcinogenic chemical, correct?

MR. TUBIN: Objection to form.

A. There were several that were measured in there. That's correct.

BY MR. TELAN:

Q. Is PCE mutagenic?

A. I'm not recalling that, whether it is or it isn't.

Q. Does it share the same metabolites as TCE?

A. Some.

Q. What are those?

A. I don't recall offhand.

Q. Is TCA a common metabolite of the two?

A. I don't think TCA comes from TCE. I think it just comes from TCE.

Q. What about chlorohydrate?

A. I don't know.

Q. What about vinyl chloride? Is that mutagenic?

A. I don't recall if that's the case or not.

Q. In terms of the time that you spent preparing your report, how long did it actually take you to prepare this report?

A. I can't break out the times. I would say you would have to add up the time. That's not in meetings, plus or minus a few hours for those meetings, and that would be the time to take to prepare the report before the date of the report of February 7th.

Q. When I look back at your invoices, it's hard to tell how much time you spent researching versus actually preparing the report. Are you able to?

A. It's the same. I don't distinguish that.

Q. So you couldn't tell us, right? You couldn't tell us that, like, 80 percent of the time was research versus 20 percent of the time preparing?

A. It's an iterative process, so I'm doing both continuously.

Q. And you had no help, right, no help

preparing the report?

A. That's correct. You know, I'll be searching a particular question, reviewing the literature, putting it into the report and then moving on to the next paragraph, next section, then find something to go back to an earlier section or something occurs to me in the shower, and then I go back the next day and I update that. So there's no way.

The only way that I would distinguish it is to say some of those meetings were more conceptual so -- and preparing for those meetings, that would be not actually preparing for the report, but the rest of the time would be all report preparation before February 7.

Q. If two chemicals share similar metabolites and both are known to be genotoxic, does that create a situation for a synergistic interaction between the two chemicals?

A. Not necessarily. They also be -- they also be, can be competitive, and it also depends that the level of damage that happens from each of those, so it could be synergistic. It could be competitive.

Q. Are you going to tell the court in this case that the cocktail, if you will, of compounds

would have been competitive? And I might use the word "antagonistic."

MR. TUBIN: Objection to form.

A. No. What I'm gonna tell the court is that there's no evidence for an additive or synergistic effect in humans.

BY MR. TELAN:

Q. Is there in smoking? Do the chemicals in cigarettes create an additive effect?

A. I am thinking about how to answer that. People are exposed to cigarette smoke, so I'm not even sure there's a way to test that, to know they're additive or competitive processes that go on. People get exposed to the single exposure.

Q. Can you separate out what cancers smoking causes to any of the single chemicals involved?

A. So there are some chemicals in cigarette smoke that we know, for example, in an occupational setting that cause that type of cigarette -- cause that type of cancer that's also seen in cigarette smoke, but you really can't separate it out, because people are exposed to smoke.

I guess there would be one exception. Well, it wouldn't be in humans, but you could

surgically resect out, for example, a tobacco-specific nitrosamine from cigarette tobacco with the implication that that would be less lung cancer, but that's actually not been tested in people.

Q. Have you heard of the term "manufactured doubt" before?

A. I don't think so.

Q. Did you hear it at all in the context of the smoking case that you testified in?

A. Not that I recall.

MR. TELAN: The next exhibit to the record.

(Exhibit 21 was marked for identification.)

BY MR. TELAN:

Q. This is an article out of Environmental Health, I guess. You're familiar with that journal?

A. Sure, yes.

Q. Out of Amherst. So this is not an industry study, right? This is an academic study? Do you see that at the bottom, "University of Massachusetts, Amherst"?

A. Yes, but you can't make the assumption that this was not industry funded. So I'm looking toward the back at the funding and declarations.

Q. If industry funded this one, I'm going to eat my own hand.

A. Well, I think good news for your hand, there's no indication.

Q. Okay.

A. It was funded by, actually, the federal government and a foundation.

Q. So this is the first time you would have heard the term "manufactured doubt"?

A. I think so.

Q. In terms of the tobacco playbook, I'm sure you've heard that before, correct?

A. Yes.

Q. And what did the playbook that the tobacco industry ran during the course of your cases involve?

A. Well, there's a number of things that they did both in terms of word and marketing and publication of studies as well as manufacturing cigarettes, so that they become more addictive over time and they lose -- and they don't lose smokers.

Q. In terms of the -- you've never read this before, right?

A. No. I've never seen this before.

Q. We won't bother too much with that,

then. Put that away for a second.

I was asking you about your search terms that you use to update research that you've done in this case. Did you come across a 2025 article on benzene by the author Yu, Y-u?

A. Yes.

Q. When did you come across that?

A. Sometime after my report.

Q. Have you added that to your materials-considered list?

A. I have not. In the notes that we were talking about earlier, I have that in there as one not being cited in my report, because the report was written before it was published.

Q. And I don't have a copy of those. You didn't bring those, right?

A. Correct.

MR. TELAN: We did ask for those, right? There's no privilege you're asserting over those notes?

MR. TUBIN: No. Earlier, you made a demand on the record, and I noted it, and we'll evaluate it for discoverability.

MR. TELAN: I just want to make sure there's no privilege being asserted for the

notes.

BY MR. TELAN:

Q. What was your takeaway from the Yu study, as you sit here today?

A. Do you have it with you?

Q. I do, but from your memory, since it's a 2025, I'm just curious what your takeaway was from that.

A. I have to see it. I see so many articles, I want to make sure I'm giving you an accurate answer.

Q. We'll get that.

When was it firmly established in your mind that TCE caused kidney cancer?

A. So you remember that I don't believe that it does, so it couldn't have been established.

Q. Is it a fair statement that, in this case, you don't believe that any of the exposures that occurred to any of the Marines or civilians on base was sufficient to have caused any of the cancers that are being complained of?

MR. TUBIN: Objection to form.

A. That's correct. Benzene is a known cause of AML, and those levels of exposure are known, so you'd have to be sufficiently exposed. And then,

secondly, the TCE literature for kidney cancer is also pretty clear about the high levels of exposure. One needs to have those reported associations, assuming you want to interpret the literature as sufficient human evidence.

BY MR. TELAN:

Q. And does that opinion hold, even with their Yu study that has come out?

A. Again, I want to see it, but the Yu study is problematic. It's essentially an ecological study from the UK Biobank, very large study, but all volunteers, and curiously has results that are positive for virtually -- I don't want to say virtually every cancer, but I think it's like 18 cancers or something, which is something that's just not biologically plausible.

Q. Just so that I'm clear in terms of causality, breaking it down individually, is it your opinion that none of the exposures at Camp Lejeune would have caused any of the plaintiffs to have developed kidney cancer?

A. Correct, because of their levels of exposure compared to those studies that report positive associations.

Q. Is it also fair that your opinion is

that no exposure at Camp Lejeune would have resulted in any of the plaintiffs developing bladder cancer?

A. It would be the same answer. Well, no, it's not the same answer, because none of the exposures from Camp Lejeune are known causes of bladder cancer.

Q. So your opinion is PCE is not a known cause of bladder cancer?

A. Yes. And that's consistent with IARC and others.

Q. Is smoking a known cause of bladder cancer?

A. Yes.

Q. Which chemical in smoking causes bladder cancer?

A. Cigarette smoke causes bladder cancer. There are -- the thoughts are that the aromatic amines in cigarette smoke do it, but, again, you can't separate out any of that from cigarette smoke to know what's causing it. It could be the aromatic amines plus other chemicals. There is no PCE or TCE in cigarette smoke. There's benzene, but benzene is not considered a cause of bladder cancer, and there's no vinyl chloride in cigarette smoke.

Q. Moving to the leukemia, your opinion

would be that there's no exposure at Camp Lejeune that would have caused any of the plaintiffs to develop leukemia. True?

A. So it's not one type of leukemia, but for all the types of leukemias as well as other hematologic malignancies, exposures at Camp Lejeune would not be causing any of those types of cancers.

Q. So when you say "hematological malignancies," that applies, also, to NHL as well?

A. Yes.

Q. You cited to the Hayes study, "Benzene and the dose-related incidence of hematologic neoplasms in China." It's a 1997 study at page 103 of your report; is that correct?

A. Yes. I have cited Hayes. I'm just not on that page yet.

Q. I believe it's page 103.

A. I've been cited in multiple places, including page 130 and elsewhere. Do you want me to go to specifically -- I guess you question is about the paper or are you --

Q. Well, I just want to go to 103, because it's the first, the first one that I could find that's in the middle of the paragraph, middle of the last paragraph.

A. Okay. I'm on 103.

Q. You mentioned that the Hayes series of papers indicate that the risk for AML combined is elevated at an average of 10 parts per million, and you list the relative risk ratio with the confidence interval, correct? Do you see that?

A. That's right.

Q. What you didn't list is that the authors also found that the relative risk was elevated for all hematologic neoplasms combined at a risk ratio of 2.2 with a 1.12, 4.2 risk ratio. True?

A. That's true, but that has nothing to do with this section. This section is about AML, so I wouldn't mention the other ones. There's other sections on NHL, for example, that does mention the Hayes paper.

Q. Did you mention that particular result?

A. I'd have to go and look. Do you want me to do that?

Q. Well, their conclusion was that the results of the study suggests that benzene exposure is associated with a spectrum of hematologic neoplasms and related disorders. Do you disagree with that?

A. Well, they have associations with the spectrum, so I don't, I don't disagree with that.

That's fine for them to say that.

Q. Okay. But you do not believe that other than acute myeloid leukemia, benzene causes any other forms of leukemia. True?

A. That's correct. And this study as well as the follow-up studies have been evaluated multiple times by IARC and others, who also said the same thing, that there's insufficient human evidence for benzene causing anything other than MDS/AML.

(Exhibit 22 was marked for identification.)

BY MR. TELAN:

Q. You cited to a paper by, the last name Poynter, P-o -- I think it's y-n-t-e-r. I might have gotten that spelling wrong, but it's not Pointer, pointer. It's P-o-y -- P-o-y-n-t-e-r. I believe that was at 103 as well and page 118.

A. Okay.

Q. If you look under the abstract, the authors state that there were significant associations between MDS, AML and benzene. And the risk ratios for AMS was 1.77 -- I'm sorry. MDS was 1.77 with a risk ratio of 1.19 to 2.63. And for AML, it was 2.10 with a risk ratio of 1.35 to 3.28. Do you see that?

A. I want to just make sure we're talking

about the Poynter paper, "Chemical Exposures and Risk of Acute Myeloid Leukemia and Myelodysplastic Syndrome --

Q. Yes.

A. -- in a Population-Based Study." Okay. So I'm on the same paper with you.

Q. Okay. Do you see that the authors also found a positive association between vinyl chloride and both MDS and AML?

A. That's what they're reporting in the abstract. I can go into the paper to see where those numbers are coming from.

Q. What they state in conclusion is that "We confirmed well established risk of MDS and AML associated with benzene exposure." Do you agree that there's a well established risk between benzene and MDS?

A. Yes, I would agree with that.

Q. You cited to the Deborah Glass study, "Leukemia Risk Associated with Low-Level Benzene Exposure," at page 109 and 110 of your report. If you would go to that, please.

A. I'm there.

Q. Was benzene also associated with chronic lymphoid leukemia?

A. That's not my recollection from the Australian studies as a statistically significant result.

Q. And so your testimony is that it was not consistent with an elevated risk in CLL?

A. My recollection is this is not statistically significant. We can look at the paper to make sure that I don't have a faulty memory.

Q. Okay. If you look at table -- I'm sorry, page 574 of that study.

A. The Poynter study or Glass?

Q. Glass.

A. Okay. So I've got to open up the Glass.

Q. I'm sorry. I thought you were on Glass. I apologize.

A. No. I was still staying with Poynter, because I didn't know if we were finished with that or not.

MR. TUBIN: Pat, what year for the Glass study you're referring to?

MR. TELAN: A video what?

MR. TUBIN: The year for the Glass study you're referring to.

MR. TELAN: Oh. 2003.

A. What's the first word of the title?
BY MR. TELAN:
Q. "Leukemia Risk Associated with Low-Level Benzene Exposure."
A. Okay. I've got it.
Q. Okay. If you would turn to page 575. The first paragraph at the top, about three-quarters of the way down the paragraph, it states, "In our study, the risk of leukemia was increased at all cumulative exposures above 1 part per million year with a strong exposure response relationship. There was no evidence of a threshold."
Do you agree with that?
A. Well, that's what they wrote. I don't think that that is correct from the data. I'd have to go back to the data and look at it.
Q. Do you want a copy of the paper doc?
A. I have it.
MR. TUBIN: You marked Poynter, right?
MR. TELAN: I did.
MR. TUBIN: So this would be 23, I believe.
(Exhibit 23 was marked for identification.)
MR. TELAN: We had mentioned the Yu

study before. We'll mark that as the next numbered exhibit.

BY MR. TELAN:

Q. This is the pre-proof doc. I'm handing it to you, unless you've got it.

Do you have the Yu study on your computer?

A. I don't have that.

Q. Okay. Now, you've read this study, right?

A. So just to be clear, we're either moving off or coming back to Glass?

Q. Moving off of Glass for now, but since you don't need to transition to your computer, we'll just...

A. Okay.

Q. Does this look familiar to you?

A. Yes.

Q. Okay. The authors in this study, do they conclude that the levels of exposure to benzene that could cause a variety of cancers was well below 1 part per billion?

A. That's what their data supports as an air exposure from air pollution.

Q. Do you have any criticisms of this

study?

A. Sure. So, admittedly, it's a large study. UK Biobank study is a study of volunteers which would be biased in many ways in terms of people being healthier, more educated, more homogeneous in terms of race, and their exposure assessments via air pollution is something that is -- it's an ecologic study, so you really don't know what people were exposed to and how and how long and that sort of thing.

They do have smoking data, which is good, but the major issue is when you look at the results, they have positive results for something like 18 different cancers, which is not only not biologically plausible, but if that were true, then multiple occupational studies of substantially higher exposures would easily be able to see, for example, the increases of breast cancer, head and neck cancer, prostate cancer, colon cancer, rectum -- rectal cancer. They've had a biliary tract cancer, stomach cancer, uterus cancer, ovary cancer, esophageal cancer, pancreatic cancer, kidney cancer, bladder cancer, brain cancer and thyroid.

If this were correct, we would absolutely know it by now, given all the studies we

have of heavily exposed persons from the NCI China study, the Pliofilm cohort. They didn't do Glaston-induced solid tumors, so I couldn't cite that. But all the other numerous studies, I looked at all the things.

So the data is just not biologically plausible and inconsistent with the published studies. This study -- this study is also, by the way, is virtually identical to the author string by, I think it was, Wang that was published a year before.

Q. Those are a mortality study, right? Was Wang a mortality study?

A. I don't have that with me, because I was gonna say that was inadvertently not cited in my report. It's a different group but the same sort of results from this -- using almost identical methodology, so this is really just an update of one more year.

I just want to point out that I didn't have it in my report. That was inadvertently omitted. But, nonetheless, if this paper were correct when you put it in the context of other papers, we would know whether or not benzene was a cause of all these other cancers and it's not.

Q. The Wang study was published before

your report was final, correct?

A. That's correct.

Q. And you're saying that you knew about it and you read it but didn't include it in the materials-considered list documents reviewed or mention it at all in the body of your report?

A. I realized after the report was written that it wasn't included. I went back. I was aware of the paper through my weekly email feed in, like, January of '24. No. I'm sorry. It was in my files of January '24 and then in my weekly email feed of April of '24, and I just inadvertently did not put it into the report.

Q. Is that email feed saved on your computer?

A. I searched through my emails. I'd see whether or not I have it or not, but if it's within a year, it's probably still within my emails.

Q. What you're saying is that study should have been included in your report?

A. Yes.

Q. But you didn't, you didn't even do an evaluation of it, correct? There was nothing in your report that was dedicated, devoted to an analysis of the Wang study?

A. That's correct. I was aware of it, and it was just an oversight that it was not in there.

Q. But the Wang study still used the .18 parts per billion, did they not?

A. I believe that's so. I mean, it was virtually identical to the study, just an entirely different research group.

Q. And it's the most well powered study of all the studies that you've looked at in terms of the number of people enrolled?

MR. TUBIN: Objection to form.

A. Now, that's totally not correct. Power is the largest number of people in a cohort, but that doesn't necessarily use more power because of both the exposure level as well as the expected effect sizes.

BY MR. TELAN:

Q. The Wang study and this study both speak to benzene causing kidney cancer, bladder cancer, NHL and leukemia at lower levels than have been reported in other studies. True?

MR. TUBIN: Objection to form.

A. I don't know what you mean by -- sorry -- speak to causing. What they're reporting is positive associations for 18 different cancers, including those with an ecological assessment of

ambient air pollution levels.
BY MR. TELAN:
Q. Let me rephrase. The Wang study and the Yu study -- let me focus on Wang. The Wang study, which was published before your report came out, speaks to a positive risk association between low-level benzene under 1 part per billion and kidney cancer. True?
A. As estimated from air pollution, which may or may not be correct, but that's what they reported.
Q. And it also reports a positive association with bladder cancer at less than 1 part per billion. True?
A. Among 16 others cancers as well, so that's correct.
Q. Including NHL, correct?
A. I believe that's correct.
Q. And leukemia?
A. Yes, that's correct.
Q. And you're saying you have the study, but it was just an oversight on your part that this single study that impacted four cancers just didn't make its way into your report?
MR. TUBIN: Objection to form.

A. That's right. It should have been included under the ecological section.

BY MR. TELAN:

Q. Why wasn't it supplemented in your materials-considered list?

A. I haven't supplemented anything.

Q. Why not?

A. I wasn't asked to. I didn't think about it. I mean, my experience is that the purpose of the deposition is to update anything from the report, and that's what we're doing here.

MR. TELAN: We marked this, right?

COURT REPORTER: No.

MR. TELAN: We'll mark that as the next number. This is the Yu study.

(Exhibit 24 was marked for identification.)

BY MR. TELAN:

Q. I guess before we leave this study, can you confirm as -- I'm sorry. You're juggling. I apologize.

Looking at -- it's probably easier if you go to the last, second-to-last page.

A. So I've lost my Yu study, I think.

Q. Okay. If you go to the

second-to-the-last page, the graph is in a better font size.

A. It's much easier on the computer.

Q. I'm not buying that.

If you go to leukemia, do you see that the relative risk is 2.11 with a confidence interval of 1.89 to 2.36?

A. Yes, I do.

Q. For non-Hodgkin's lymphoma, do you see that it's 2.11 with a confidence interval of 1.92 to 2.30?

A. Correct.

Q. If you go down to kidney, do you see it's 1.95 with a confidence interval of 1.76 to 2.17?

A. Yes.

Q. And then for bladder, it's 1.86 with a confidence interval of 1.69 to 2.04?

A. Yes. And can I just supplement? You asked me about the criticisms of this paper.

Q. Sure.

A. So you can also see from this figure that they also have consistently, for all of those 16 or 18 cancers, increases in toluene and xylene, which again would make this paper an extreme outlier, given that there are a bunch of toluene and xylene studies.

Also, speaking to your issue of synergy, at least for benzene, toluene and xylene, which at least some people think theoretically should share mechanisms for things like genotoxicity and that sort of thing.

Some people claim that there is benzene in toluene and xylene, so they have the column here for BTEX, which is a combination of all of those. And you see that the risks are actually lower for co-exposures than they are for benzene, certainly failing to support a concept of synergy or additiveness.

MR. TELAN: Next numbered exhibit is going to be -- is it 25?

BY MR. TELAN:

Q. This is Wang study that you were discussing earlier, Dr. Shields.

(Exhibit 25 was marked for identification.)

A. And I know you want to hold on to that for a second, but I may come back to that. Okay.

BY MR. TELAN:

Q. We've talked about this. The graphs are a little easier to read, but this is mortality, correct, mortality study?

A. Yes.

Q. And the conclusions are "Long-term exposure to low concentrates of ambient benzene significantly increases mortality risk in the general population."

And if you look at specifically on page 990 under "Leukemia," the risk ratio is 1.22 with a confidence interval of 1.12 to 1.33. Do you see that?

A. I'm sorry. For leukemia, under Figure 1?

Q. Under Figure 1, yes.

A. Yes, I see that now for the crude model.

Q. Okay. And then under "Non-Hodgkin's Lymphoma," it's a 1.19 with a confidence interval of 1.09 to 1.30, correct?

A. Yes.

Q. And I take it you would disagree with the author's conclusions about long-term exposure to benzene?

A. Well, I can't argue with their data. I have to go back and remind myself what they consider limitations, but there are clearly problems with this data about them finding such relative risk assessments are statistically significant or hazard ratios is statistically significant. That's not been shown in

repeated high level exposure studies.

Q. If you look at the authors in this study and the last study we just looked at, the Yu study, I thought you said that they were all the same except for one.

A. No. They're all different. It's a totally different research group using the same data, the same methods and, in some cases, virtually the same language.

Q. So two different groups of scientists studying the same cohort, correct?

A. That's right, using exactly the same methods.

Q. One was a mortality study, and one was an incident study?

A. That's right.

MR. TUBIN: Pat, we're coming up on the hour, if you get to a stopping point soon.

MR. TELAN: Sure. We can take another five if you want.

MR. TUBIN: All right.

VIDEOGRAPHER: We're now going off record. The time is 4:58.

(A recess was taken from 4:58 to 5:09.)

VIDEOGRAPHER: We are now back on the

record. The time is 5:09. You may continue.
BY MR. TELAN:
Q. Dr. Shields, you cited to the Tomasetti paper in your report. You're not going to tell the judges that 65 percent of cancers are more, are caused by bad luck, are you?
A. I cited several Tomasetti papers, and that sounds at least correct, if not higher.
Q. You believe that 65 percent of lung cancers are caused by bad luck?
A. That's a different question. I thought you were asking about all cancers.
Q. I changed it up on you.
A. So lung cancer is the exception, where 90 percent of lung cancer is caused in some way by smoking, but for most of the cancers, most patients don't have identifiable causes. So, for example, smoking is a known cause of AML, but most AML patients are not smokers.
Q. You know that that paper has been under a tremendous deal of scrutiny, correct?
MR. TUBIN: Objection to form.
A. I'm well aware of both sides of the issue.

BY MR. TELAN:

Q. Do you -- did you ever see an interview with Dr. Tomasetti, who he said that he did not mean to imply that 65 percent of cancer is actually caused by bad luck?

A. No.

Q. In your book, cancer epidemiology -- I'm sorry, Cancer Risk Assessment.

A. It's a great read.

Q. So I have to ask you a question, because I spent a lot of money on it.

A. So, theoretically, I should be getting a check.

Q. You are.

A. If the publisher can even find me.

Q. I've got a feeling you're going to bill me for today.

A. Yeah.

Q. Under -- I'm going to read this to you, and I'm going to give it to you. I didn't make a copy, because I don't -- first of all, I think it violates...

A. Copyright law?

Q. Yeah. At page 175, "Environmental Lifestyle and Behavioral Factors," it states, "A

conclusion from the descriptive and analytical epidemiology of cancer is that cancer should be largely, although not completely, preventable, and that environmental and behavioral factors should account for a large percentage of the total cases, often estimated up to 80 percent of cancer."

Does that sound correct to you?

A. I think that's been evolving since then. Who -- is that my chapter or is that someone else's chapter?

Q. It's called "Cancer Epidemiology." Let me see who wrote it.

A. I didn't write that chapter.

Q. You edited the book, right?

A. Correct.

Q. So if you would have disagreed with it, you would have let the author know, correct?

A. Not necessarily, no. What I do is when I edit it, I make sure that it's quality, but each individual author is entitled to their own academic freedom and opinions.

Q. This is Dr. James Cerhan from the Mayo Institute?

A. Sure. I mean, you know, depending on some people's views, they feel like if we could deal

with smoking, obesity, get everyone to exercise correctly, you know, lifestyle, then most cancer should go away. In fact, after all these years, that's not happening. An understanding of bad luck with carcinogenic mechanisms, we understand now that more cancers, if not most cancers, in those patients who don't have identifiable risk factors, are probably getting it.

You know, they call it bad luck. Some people really don't like to call it bad luck. The issues is, is that this is a carcinogenic process that we've known predating Tomasetti, so there was nothing new to it.

But, you know, as your body does what it does, you know, DNA replicates, cells replicate, typographical errors happen, immune system gets revved up by internal problems. DNA damage from external sources, from internal sources don't get repaired. Program cell death doesn't happen. These are all cumulative events that happen that are really beyond our control.

Q. But you would agree what I just read to you contradicts Dr. Tomasetti's theory on bad luck being a cause of cancer, correct?

A. Well, that was written many years

before Tomasetti. After Tomasetti and Bert Vogelstein published their paper, there was a large pushback from the prevention community, because they interpreted that paper.

And in their subsequent papers, which they clarified, what they were saying was everyone was thinking that, like, gee, everyone is gonna now understand that prevention doesn't matter, and we all can smoke and drink and overeat and not exercise.

And that's not at all what Tomasetti and Vogelstein were saying. And in subsequent papers, they clarify what it is, but they showed mathematically that those cancers that have higher replicative rates, meaning they had a higher chance of errors, were well associated with the actual incidence of those cancers. So the prevention community didn't like the message. A lot of them didn't understand the data and analysis. A lot of folks like us were like, yeah, that's something we knew a long time.

Q. But doesn't the exposure to mutagenic compounds increase the risk of spontaneous mutations?

A. Say that again.

Q. Does the exposure to mutagenic compounds increase the risk for spontaneous mutations?

A. I'm trying to think about how to

rephrase that. I know what you're asking me. So, look, if you're exposed to -- so we get exposed to carcinogens every day beginning, you know, from conception. Those carcinogens can be made in the body endogenously, and they can come from external sources like we're exposed to benzene every day and we're exposed to diesel exhaust every day and these sort of things.

Over time, these things accumulate, but the body has an amazing ability to repair that damage, and so if you get a mutation that's on the way to cancer, the body can either repair it or realize that, gee, that's a problem we can't repair. So there's something called program cell death, and dead cells can't become -- can't go on to become cancer.

So what happens is that these things go awry over time, but, you know, if you think about it, it's kind of amazing we all don't get cancer by the age of three with the carcinogens we're exposed to, and that's because we have all these protective mechanisms.

It's amazing that, you know, 100 percent of cigarette smokers don't all get lung cancer, and it's only one in ten, because we have all these protective mechanisms. And so those folks who

have no identifiable risk factors, the leukemia is the breast cancers. I mean, that's because they're -- it's this home view of things that are happening that are not getting repaired. And, ultimately, for most cancers, it's a disease of aging. So the older you get, the more you accumulate and the more you have a chance of actually developing a clinical cancer.

Q. When you said the body has a remarkable way of healing itself, you're talking about the immune system, right, the adaptive immune system?

A. DNA repair, program cell death. There's a number of different hallmarks of cancer that both control and contribute to cancer.

Q. Is that through the immune system?

A. That's only one part of it.

Q. But does an exposure to an immunotoxic drug repair the body's ability to repair damage done by a mutagenic compound?

A. Not that I know of. The immune system helps surveillance to get rid of bad things in our body, including cancer cells. One of the problems with cancer is that it gets smarter than our bodies. It escapes the immune system so that it can grow, and a lot of our newer drugs now target that.

But the theory is for some medications

that really mess up the immune system, or something like HIV, that makes it a permissive growth, but that's not the case for things like -- you know, that's the theory for benzene and AML. It is that you're actually -- it's more of an immune system problem than it is a mutagenic problem.

It's all theory. But they're separate issues in terms of the immune system may go off actually and cause things like oxidative damage and free radical damage, which then can cause mutations as yet another pathway, but the immune system is really more in terms of immunosurveillance and not clearing out sort of bad things.

Q. So you're going to say outside of smoking, bad luck is responsible for the majority of cancers?

MR. TUBIN: Objection to form.

A. Alcohol, obesity, poor exercise, some people, which is the Tomasetti-Vogelstein stuff, there's hereditary cancers. So what I'm saying is that for most cancers, most patients don't have any identifiable risk factors. You know, they're the classic healthy, not overweight, nondrinker, nonsmoker who gets colon cancer, and that's what most of those patients are.

MR. TELAN: We're going to mark this next exhibit as 27.

MR. TUBIN: You said you were going to show him the book after you read him that passage.

MR. TELAN: Oh, I'm sorry. We'll get back to that. I've got to move on, because we've got to move on. We've got about an hour left.

MR. TUBIN: Okay.

COURT REPORTER: Twenty-six.

MR. TELAN: Oh, 26. I'm sorry.

MR. TUBIN: Correct. Yeah.

(Exhibit 26 was marked for identification.)

BY MR. TELAN:

Q. By the way, as far as obesity goes, there's no identified mode of action by which -- let me ask in this. Do you believe that obesity is a cause or a risk factor for cancer?

A. For some cancers, it's a cause.

Q. Which cancers?

A. Gee, I'd have to go back and look. Colon cancer, AML. You know, there's probably about a half a dozen or so. And the reference that I would

look to is IARC did a very nice review on what they thought was sufficient evidence for obesity and cancer, and that's cited in my report. And, you know, we could find that, but that's in there.

Q. What's the mode of action?

A. So the mechanism of action is probably a pro-inflammatory immune system problem where you're causing inflammation that then causes DNA damage and suppresses the immune system for surveillance.

Q. Is that a hypothesis or a known fact?

A. Well, obesity certainly does that. It's definitely a pro-inflammatory state. So that's the concept for how it's causing cancer.

Q. In the bone marrow?

A. I actually don't know either way, the bone marrow. I actually never thought of that either way, so I don't know whether there's data for that or not. But, you know, certainly, the immune system gets activated with obesity in ways, and then there's other issues about storage of certain effects on steroids and hormones and other things. I mean, obesity really affects a lot of carcinogenic mechanisms in different ways.

Q. There are studies that speak to how chemicals like benzene and TCE impact neutrophil

counts and lymphocyte counts over time in patients who've been exposed. True?

A. Well, there are cross-sectional studies that have -- there's a whole section in my report on this. There's cross-sectional studies that will associate benzene exposure with decreased neutrophils and the next study doesn't. But since, oh, it affects it has an association with platelets, and the next study, no, it's hemoglobin. So there's really not consistency. What we know is high dose benzene exposure does serious bone marrow depression in aplastic anemia.

Q. Does obesity cause any of those markers to be elevated or lowered in the blood?

A. Not that I recall.

Q. If you'd look at the next numbered exhibit, this is the Odutola case. I think that you may have cited to this at page 121.

A. Correct.

Q. Do you see that the authors here found a positive association with exposure to any solvent and follicular lymphoma with a risk ratio of 1.16 and a confidence interval of 1.00 to 1.34? Do you see that?

A. Yes, I see that now.

Q. And they also found an appositive association between chlorinated solvents on a meta-analysis at 1.35 and a confidence interval of 1.09 to 1.68, correct?

A. That's what they report in the abstract.

Q. And benzene -- I'm sorry. TCE, PCE and vinyl chloride are all chlorinated solvents?

A. Right. But you understand that benzene, at least in this study, was not associated or had an overall summary estimate that was statistically increased. It looks like they have chlorinated solvents, but they're not breaking down the type of chlorinated solvents, and there's a wide variety that makes the issue around biological plausibility.

Q. But the benzene is elevated on the risk ratio. You're saying that it's not statistically significant with the .88 to 1.75 confidence interval, correct?

A. I think you're reading the wrong line, but it's numerically increased with a confidence interval as .86 to 1.97.

Q. Correct. Right. And you call this a null value. True?

A. Yes. I would say this is not

statistically significant and fails to support the hypothesis that benzene is causing or is associated with follicular lymphoma.

Q. Would it be equally as reasonable to say that the dataset is consistent with a positive association but that the range of parameter values extend from below the null to an increase of 197 percent?

A. That would not --

MR. TUBIN: Objection to form.

A. That would not be a correct way to describe the results of this paper.

BY MR. TELAN:

Q. You cited to the Rana study, which is a benzene NHL study at page 173. I'll hand that to you as well. If you go to 173, I think you'll find it there. Do you see that?

A. Yes.

Q. You don't cite to the strengths of the study, correct?

(Exhibit 27 was marked for identification.)

A. Well, I cited that their conclusion was that they believed that Bradford Hill criteria were met, and so I went on to evaluate the study.

BY MR. TELAN:

Q. But you disagree with the conclusion of the study, that there's a causal link between benzene and NHL, especially for diffuse large B-cell lymphoma?

A. Well, so they provide a discussion of Bradford Hill analysis, which is sort of like a hand-waving thing.

Q. What do you mean by that?

A. But they don't -- well, they're like the final criteria of biological plausibility is satisfied given current knowledge regarding the causes and mechanisms of NHL, period, and then they go on. Key risk factors for non-Hodgkin's lymphoma include immunosuppression and pre-existing autoimmune disease, neither of which are relevant to benzene exposure.

So it's really hard to understand how they got to this meta-analysis, and I'll just note the senior author, Luoping Zhang, maybe it's this paper but was recently thrown out of court with the judge calling her work junk science, and I think that was this paper, but I may be misremembering that.

Q. You know that Dr. Valberg, Dr. Goodman's boss, was also accused of testifying contrary to the consensus of science by a court, correct?

MR. TUBIN: Objection. Objection to form.

A. You're asking me whether his opinions were thrown out, like in a Daubert or something?

BY MR. TELAN:

Q. I'm not sure if they were thrown out, but the judge's order stated that his testimony was inconsistent with science.

MR. TUBIN: Objection to form.

A. I have some recollection of that.

BY MR. TELAN:

Q. But Dr. Rana was not the primary author -- I'm sorry. Dr. Zhang is not the primary author on that, on this report?

A. No, that's not correct. She was the senior author, and correspondence is directed to her.

Q. So even though she's the last on the chain, are you saying she's the primary author of the study?

A. Yeah. The way, the way it works, depending on the discipline, is that the first author is the one who actually did the writing. The last one is the senior person who takes the responsibility and dealing with the correspondence. That's not 100 percent of the time true, but that's a pretty

conventional practice.

Q. And your testimony is that, based on what she found in this report, she was Dauberted out of the case based on this being junk science?

MR. TUBIN: Objection to form.

A. I think, I think this report, I know for sure a judge labeled her work as junk science, which is really huge, and I think it's this one, but I could be misremembering that.

BY MR. TELAN:

Q. This is a study out of Cal Berkley, right?

A. That's correct.

Q. Not an institution that's known for junk science, correct?

MR. TUBIN: Objection to form.

A. Actually, some of their folks are really high quality scientists, and a large number of the people that I know there are also plaintiffs' experts.

BY MR. TELAN:

Q. Is Martin Smith a high quality scientist?

A. Yes.

Q. The Karami study is one you cited at

page 139 of your report. We'll mark that as the next numbered exhibit.

(Exhibit 28 was marked for identification.)

BY MR. TELAN:

Q. This is a TCE exposure and haematopoietic cancer study?

A. Correct.

Q. If you look at the study itself in the first paragraph introduction, it talks about the National Academy of Sciences recommending that the additional meta-analysis be conducted to further examine human health and TCE and that, as a result, in 2011, the U.S. EPA released its human health assessment raising the classification of TCE to carcinogenic to humans. Do you see that?

A. Yes. I see where you're reading that.

Q. Okay. If you go to page 592 under the second paragraph from the top, about midway down, it says, "TCE exposure has ... been shown to stimulate unscheduled DNA synthesis in vitro in human lymphocytes, a mechanism that has been associated with increased cancer risk. Since TCE can dysregulate and impair immune functions, concerns about the solvent's immunotoxic effects have motivated numerous

investigations of the association between TCE exposure and lymphoma risk, which have been associated with reduced immune function."

Do you agree with that?

A. I'm sorry. I'm still trying to find where you have that.

Q. See, if you had the paper.

A. I'm holding the paper.

Q. Oh, you are? All right. So if you look at -- if you look right here.

A. I'm going to make you pay for this at some point.

MR. TUBIN: 592.

A. 592? 592?

BY MR. TELAN:

Q. 592.

A. Oh, you're in the introduction area. Okay. Sorry. I was looking in the back.

Q. I said 592.

Do you agree with that sentence that I read?

MR. TUBIN: Please remind Dr. Shields the starts of the sentence. I just want to make sure we're...

A. It's the second -- it's the first full

paragraph.

MR. TUBIN: Okay.

A. I have no problems with their summary of the literature that way.

BY MR. TELAN:

Q. In terms of the findings under page 593, with the cohort studies, they found an increased risk estimate of 1.52 with a relative risk of -- I'm sorry, a confidence interval of 1.29 to 1.79. Do you see that?

A. Yes.

Q. And at page 595, they speak to their review and that -- it's toward the bottom right. "In contrast to the most recent meta-analysis of TCE exposure and NHL risk, our review integrated results from an updated cohort study with 12 additional years of follow-up." Do you see that?

A. Yes.

Q. If you go to the back page at 598, "In summary, our meta-analysis differentiated between studies that assessed TCE exposure specifically and those that evaluated exposure to broader groups of chlorinated solvents."

This is a high quality study, is it not?

A. It's a meta-analysis and there -- I did note in my report that -- so the short answer is it is, it is a high enough quality meta-analysis, serve one -- you know, serve as an important tool in providing that overall summary estimate. It doesn't evaluate the individual studies for a weight of evidence concept, and this was 2013, and for some of the studies, at least one of them that drove the result was updated with no results. So that's specifically the Hansen study from 2001, and they don't have the Hansen 2013, which could easily change the results. And, of course, they wouldn't have the 2013, because this is also 2013.

Q. They could have had that, right?

A. Probably not. They're probably being published at the same time.

(Exhibit 29 was marked for identification.)

BY MR. TELAN:

Q. If we look at PCE in bladder cancer, you cited to this in your report, the Vlaanderen study at page 216. Did I hand that to you already?

A. No. Did you get one?

MR. TUBIN: Yeah.

BY MR. TELAN:

Q. I believe that you mentioned that these results were null. This is a PCE dry cleaning study, correct, from 2014?

A. Well, they did both. They looked at PERC, which was not increased, and then dry cleaners that frequently use PERC that was statistically increased.

Q. And so if you just look at the beginning, this is -- I know what your answer is, but I'm just going to ask it anyway. The PERC study reveals an increased relative risk but a confidence interval that includes the null value. In the first paragraph for the PCE workers, you would say that that's a null value, correct?

A. It's a null value, including people who would be regularly using PERC at high levels.

Q. Okay. Now, for the dry cleaners, the meta risk was 1.47 with a confidence interval of 1.6 to 1.85, correct?

A. That's correct.

Q. So what's the significance of that?

A. Well, for the purposes of the Camp Lejeune litigation, the important result here is the tetrachlorethylene-exposed workers. As far as the dry

cleaners itself, some of them would be exposed to PERC, but they would have other exposures as well, which they didn't define. As they say, they encouraged mixed exposure.

Q. But this study found a positive result between PERC exposure and bladder cancer in the dry cleaning population, correct?

A. No, that's not correct.

Q. What's not correct about that?

A. What you just read. The meta relative risk among tetrachlorethylene-exposed workers was 1.108, 95 percent confidence interval, 0.82 to 1.42. So when they look at the ones where they know that dry cleaners were exposed to tetrachlorethylene, they did not have the increased risk.

Q. Well, the meta for bladder cancer for laundry and cleaning workers was 1.20 with a confidence interval of 1.06 to 1.36. You didn't mention that, correct?

A. Did not mention it where?

Q. In your report.

A. No. It's mentioned.

Q. The positive finding with the confidence interval?

A. I don't know if I put the confidence

interval in there, but I did point out that they had a result, a positive result for dry cleaners where they did not identify whatever the theoretical potential bladder carcinogens were for those folks.

Q. But your conclusion, though, was that this was a null result in terms of PCE and bladder cancer?

A. That's absolutely correct.

Q. I am not sure if you cited this paper. It's the next numbered exhibit.

MR. TELAN: What number is this?

MR. TUBIN: Vlaanderen was 29, and then this should be 30.

COURT REPORTER: What's 28?

MR. TUBIN: Karami.

MR. TELAN: Karami, yeah.

(Exhibit 30 was marked for identification.)

BY MR. TELAN:

Q. Did I hand that to you or not yet?

A. I have one.

COURT REPORTER: 29 is?

MR. TUBIN: The author is Jelle Vlaanderen, "Tetrachloroethylene Exposure and Bladder Cancer Risk." It looks like this.

Do you need 28 too?

COURT REPORTER: This is 28?

MR. TUBIN: Yes.

COURT REPORTER: Are we up to 30?

MR. TUBIN: Correct.

MR. TELAN: I thought I was putting them here for you. I'm sorry. Thanks, Marcus.

MR. TUBIN: You guys help me out, so, you know.

BY MR. TELAN:

Q. All right. So I don't believe that you cited to this, Dr. Shields, but you see that the risk of living close to a petrochemical facility resulted in hematologic malignancy, specifically leukemia at a relative risk of 1.3, with a confidence interval of 1.09 to 1.55. Do you see that? That's on page 6 of 18.

A. Okay. I see the result. I'm just reviewing the paper.

Okay. I see where you were showing Figure 2 for people living within 5 kilometers of a petrochemical plant, some of them categorizing as downstream, some of them upstream, which tells me they have no idea what the weather patterns are. But even

more importantly, not only are they combining all types of leukemia together, but they're including childhood leukemia, which is a totally different ballgame, and at the same time on Figure 4, they do not have an increased risk of NHL with all the same caveats.

Q. You didn't consider this study, correct?

A. I did not consider it. In looking at it now, I would give it no weight because of its poor methodology.

Q. This was a systematic review looking at 16 different studies, correct?

A. That's what they wrote.

Q. You cited to the -- I'm not going to pronounce it correctly now -- Seyyedsalehi study. It's a benzene kidney-bladder study; is that correct? That's 31.

(Exhibit 31 was marked for identification.)

BY MR. TELAN:

Q. And I know that you don't believe that benzene causes either kidney or bladder cancer, correct?

A. That's correct.

Q. So the association between benzene and kidney cancer and unspecified urinary tract cancers with a relative risk of 1.20 to a confidence interval of 1.03 to 1.39 you don't find to be convincing for the association. True?

A. Well, there's several things. I mean, I just want to make it clear there's several things you or one takes away from meta-analysis. One is that overall point estimate, which is what you're citing, which is an important tool, but that's not the be all and end all of the meta-analysis. There's other things that you have to look for, including heterogeneity publication bias. And then, on top of that, the most important figure is the forest plot, and when you look at that for kidney cancer, which I'm trying to find.

BY MR. TELAN:

Q. Is that Figure 2? On page 208?

A. Right. So in this case for bladder cancer, they have no increase in risk, which is one of your allegations. But for kidney cancer, so we're cherry-picking out the results we like or dislike for your plaintiffs' experts.

If you look at that forest plot, that's a very unconvincing forest plot. They don't take into

consideration because meta-analyses don't do that, which is the weight of the evidence for the papers themselves. So they don't say the Pukkala is a higher quality study, the Gun is a lower quality study. All they do is look at the summary estimate or the reported estimate, and they often pick what risk estimate, relative risk ratio, what have you, from the paper when they often report multiple results.

And all these things do is really talk about just the size and where that point estimate falls. But when you look at the forest plot, that's pretty unconvincing for a meaningful result, even if it is statistically significant.

Q. And you're looking graphically at the forest plot, but the relative risk doesn't change. It's 1.2, correct?

A. That's what they're reporting as their relative risk, but that doesn't take into account the actual consistency of the high quality studies.

Q. So you're saying this is a poorly -- you don't find the conclusion to be persuasive based upon your belief that this is a poorly run study?

MR. TUBIN: Objection to form.

A. No, I didn't say this was a poorly run study. What I'm saying is that a meta-analysis is

only one tool of the process of the causation analysis. None of them really take into account the high quality studies unless they specifically say we're only going to give you a meta-analytic result for those studies, for example, that have also had AML. So you know that they're high exposed studies or studies where, in these industries, they're known to be the highest or for sure benzene study.

So if they don't do that, they don't give you any information about whether they're comparing apples and oranges. What they're giving you is a number. You can put numbers into the computer and get one out, and that's typical for meta-analyses, but that's only one piece of the puzzle here.

BY MR. TELAN:

Q. I'm going to hand you the next numbered exhibit is a benzene non-Hodgkin's lymphoma study. You cite to it in your report, and you copied the part of the abstract under "What's New?" on page 171 to 172, I believe.

Does this study ring a bell with you?

A. Yes.

(Exhibit 32 was marked for identification.)

BY MR. TELAN:

Q. Why did you not include the first part of the box that has the relative risk ratios and just the, just the "What's New?" under the abstract?

A. I guess I'm not sure what you're asking me, because I do cite the NHL risks on page 170 in a table that's called "Large Studies for Benzene Exposure, NHL Risk." The first paper is Bassig 2024, which is what we're looking at. And I note that it has statistically significantly cohort size of 73,087 with an NHL risk of 1.6 and 95 percent confidence interval of 1.2 to 2.2.

Q. Did you cite the elevated risk for chronic lymphocytic leukemia?

A. Well, let me look.

Q. The pending question is did you cite to that?

A. Yeah. I'm looking at my CLL section. So this is cited. Since it's a null study, there's a statement about CLL and null studies, which includes this.

Q. You don't cite the risk ratio or the interval. You just call it a null study, correct?

A. That's right.

Q. And so you would disagree with the

conclusion of the authors at 2166 that, "Overall, our pooled results suggest a significantly elevated risk of NHL across all three benzene exposure metrics ... And higher cumulative benzene exposure was associated with an increased risk of NHL in both Chinese men and women"?

A. I'm sorry. Where are you reading that?

Q. Right above the author's contributions, last paragraph, "In conclusion." It's about halfway down that paragraph.

A. We're talking about Bassig?

Q. Yes, Bassig.

A. 2024.

Q. Yes. Page 2166.

A. Oh, 2166.

Q. It's at the very end, right above author's contributions.

A. I see. Let me just -- okay. I'm there now.

Q. You didn't --

A. Hang on. Hang on. I haven't answered your question yet.

Q. I thought you might have forgotten.

MR. TUBIN: I think the page numbers for us got obscured by the staples.

MR. TELAN: He's there now, I think.

A. So you're asking me whether I agree with, "Overall, our pooled results suggest a significantly elevated risk of NHL across all three benzene exposure metrics --

Q. Yes.

A. -- examined, and higher cumulative benzene exposure was associated with an increased risk of NHL in both Chinese men and women." That's what their data shows.

Q. And this is a good study as well, correct?

A. This is a good research group. The Shanghai cohorts by Wei Zheng, both men and women, there could be some concern about comparing -- or, I'm sorry, combining two disparate studies, but I don't really have a problem with their overall methodology.

MR. TELAN: Give me about 5 minutes, 10 minutes, and then I'm think we're home stretch on the last 30 here.

MR. TUBIN: Okay.

VIDEOGRAPHER: We are now going off record. The time is 5:53.

(A recess was taken from 5:53 to 6:09.)

VIDEOGRAPHER: We are now back on the

record. The time is 6:09. You may continue.
BY MR. TELAN:
Q. I know you've been asked this before, but in terms of reaching consistency under a Bradford Hill evaluation, you can reach consistency having a number of positive risk associations with confidence intervals that include the null value. True?
A. I wouldn't do that. The analogy I use, if your doctor says I'm going to give you a medicine that's been studied 10 times, but it's never been statistically significantly proven, you would probably get another doctor.
Q. In prior depositions, you've said you could, but it's not common, correct?
MR. TUBIN: Objection to form.
A. I don't think that's correct. You can show me what you're talking about. That's what meta-analyses do. They try to combine studies that are null, hoping to come up with a summary estimate, but that fails to consider the individual studies.
BY MR. TELAN:
Q. Okay. So would your testimony then be that you could not absolutely, 100 percent could not reach consistency having numerous positive risk ratios but having confidence intervals that include the null?

MR. TUBIN: Objection to form.

A. "You" meaning me in particular or are there people who do that?

BY MR. TELAN:

Q. You in particular. I'm asking you.

A. If I had -- if all the high-quality studies were all not statistically significant, I would say that that's not supportive of a sufficient human evidence. You could say that there's associations, you know, limited evidence of a certainly not sufficient. You have to have high-quality studies that are showing statistically significant increases with dose response relationships and plausible strength of associations.

Q. Let me add to that. Let's assume that you have positive biological plausibility from animal studies in that scenario. Can you reach the consistency under Bradford Hill analysis?

A. That's a totally different guideline, so they're mixed, so, no, if biological plausibility is evaluated separately from consistency. Some of your experts are confused, and they say, well, under consistency, there's an epi paper like Bove and there's animal studies. That's consistent. That's not ever what Bradford Hill did, nor is how it's

applied today. They just didn't understand it.

Q. And when you say some of our experts were confused, who are you speaking about directly?

A. I'd have to go to my report. So I have those tables, and we'd have to go through each one. So you can figure it out pretty easily.

Q. I think I remember you mentioning Dr. Hu and Dr. Mallon.

A. There was at least two of them that were just using it totally incorrectly.

Q. And what would you cite to as a, as the authority for how Bradford Hill should be applied?

A. Well, of course, there's the Bradford Hill, and they're from the 1960s. But now among the explanations is the IARC preamble, which was updated in 2020. But lots of -- EPA, you know, describes that the Bradford Hill, there's this scientific reference manual from the federal judicial center that describes how to apply those criteria. There's lots of agencies. There's really not a whole lot of deviation among them for how they interpret it.

Q. There's no set structure as to how many of the considerations need to be met before causal relationship is satisfied, correct?

A. That's correct. What it depends on is

what's your available dataset. Bradford Hill says we don't need all of them, but if you have data for all of them, then you can't ignore any of the data. So when you have a robust epi database, you have to have consistency dose response and strength of association. You just can't throw them out and say, well, I've got biological plausibility.

Having said that in some policy constructs, some agencies will decide to -- and, in fact, IARC will say something is a known carcinogen based on mechanisms alone and limited human evidence, but that's really a precautionary principle policy concept.

Q. And you disagree with that, correct?

A. Not for policy. I'm not a policy environmental person, but if that's what regulators or agencies want to do as their criteria, again, it's transparent. I don't disagree with that, but that's not what we're talking about here for general causation.

Q. Going through your report, I have a couple questions for you. If you can pull it up at page 8.

A. Okay.

Q. At number 8, you state, "Most patients

with cancer have no identifiable exogenous risk factors for their cancer, which is referred to as an idiopathic cancer."

What do you mean by "idiopathic cancer" as you used it there?

A. It's just there's no exogenous external causes, so not smokers, not obese, not drinkers. That's all the stuff we were talking about earlier about the inborn errors.

Q. But so, for instance, benzene, you would say, is only a risk factor for AML and for no other cancers. True?

A. That's correct. And for sufficient human evidence, yes, and in sufficient levels of exposure.

Q. And for TCE, it's only a risk factor for -- you wouldn't agree with that. You don't even believe that TCE is a risk factor for kidney cancer, even at high levels of exposure, correct?

MR. TUBIN: Objection to form.

A. So -- so the way I'm phrasing it is you've heard me is arguably, it is. If you want to believe that it is, then you can go to those papers and identify the levels of exposure that are statistically increasing risk. And so should I take

the opinion that there is sufficient data? I also have dose data and say I can play on the other side of people who believe that there's a causation.

BY MR. TELAN:

Q. But in the argument, you would take the alternative that there really is no causal relationship between TCE and kidney cancer?

A. So I'd say there's insufficient human evidence, but if someone wanted to conclude otherwise, based on the higher quality studies, here are the levels of exposure that statistically associate with increased risk, and I have a table in my report that shows those papers.

Q. The statement in number 2, "Precancerous cells can revert to normal cells," is that accurate?

A. Oh, yeah. A lot of lung lesions, breast lesions, colon lesions, there's a whole science behind that, which is pretty interesting stuff.

Q. Are there precancerous cells in the hematopoietic cancer, or is that just solid tumors you're talking about?

A. No. There's -- there are precancerous cells that never go on. So there's something called clonal hematopoiesis, and you can find that a lot of

our bodies' clones that have gene mutations that ultimately, are ultimately found in AML, it's thought that those people who have it and, likely, some of us in the room have it, but it's unlikely that we'll all get AMLs. So it's a small fraction. Interestingly, about those cells, they call them chips, also increase the risk of heart disease, and it's not clear why, but that would be an example of malignant -- or not malignant, but premalignant cells that never go on to become cancer.

Q. From an epidemiological standpoint with rare cancers, is it more difficult for a study to find an association?

A. So the answer is it depends on how rare it is. There's two parts. People always say that, and your experts are saying that, but the fact is something like mesothelioma and asbestos-exposed workers with mesothelioma is extremely rare. All you need, though, is one case in a study, and the risk estimate is sky high, and since it's a little significant. The same is true for angiosarcoma and vinyl chloride. Now, when you want to say, well, gee -- well, let's take CML or --

Q. Follicular?

A. Thank you. Let's take follicular

lymphoma, and you say, well, gee, that's too rare so we're not gonna see it. But isn't that the point? If benzene is causing follicular lymphoma, would it be rare in that study of people who have very high levels, hundreds of parts per million exposure to benzene? It wouldn't be rare. We would see that.

So this concept of because it's rare, we need bigger studies, power depends not only on the size of the study but the effect size. And if you really believe that benzene is causing follicular lymphoma, then you should see that in sky high rates in the Pliofilm cohorts and the NCI cohorts and you don't.

Q. You don't believe there's any risk factor for follicular lymphoma, do you?

MR. TUBIN: Objection to form.

A. I think obesity is one of them. I'd have to go back and look at the review, but I think for follicular lymphoma, that might be the only one. I don't think there's any viral etiologies, but I may be misremembering that. I think that's one of the ones where we just don't know the causes.

BY MR. TELAN:

Q. What about for urothelial cell cancers?

A. Are you talking about, like, renal cell

cancers?

Q. Yeah.

A. Smoking, obesity, hypertension, kidney stones. I had a section in my report on the major causes of cancer that will include that. I mean, I can go to the report, but there's a section also on kidney cancer that talks about the etiology, but those are some of the ones that are known risk factors for kidney cancer.

Q. And just so that I'm clear, when you say "obesity," let's me ask you this. If you're overweight, you would say that that would predispose you to renal cell carcinoma more than drinking benzene every day for two years?

MR. TUBIN: Objection to form.

A. Yeah, absolutely. I mean, there's no -- the evidence for benzene and kidney cancer is extremely weak, notwithstanding the paper we just went over. Now, there's two parts to that question, which was also the overweight concept, and BMI is a continuum, so I'd have to go back and look to see whether or not a BMI representing overweight at 27 is a risk factor at all or is that too little, as opposed to meeting that BMI of 32 or 35.

BY MR. TELAN:

Q. Is obesity -- when you've used the term "obesity" here, do you mean morbidly obese or just a degree of obesity?

A. I'm generally referring to it as a 30 to 35 BMI, which is obesity, as opposed to morbid obesity. Morbid obesity would be worse.

Q. So you're saying that if somebody has a BMI of 35, they're at higher risk for any cancer than if they were to drink TCE every day for two years?

MR. TUBIN: Objection to form.

A. Boy, that gets more confusing. So drinking TCE, if you believe that TCE causes kidney cancer, you'd have to drink enough TCE to mirror the exposures in the occupational studies, and I think you would probably die of neurotoxicity from TCE exposure by drinking that much to mirror the exposures in the workplace. It depends on dose.

BY MR. TELAN:

Q. Does TCE cause neurotoxicity?

A. Yeah. Dizziness, vomiting. I mean, it's acute neurotoxicity.

Q. Changing the question to you about obesity, it'd be your testimony that a BMI of 35 would be a higher cause of non-Hodgkin's lymphoma than

drinking TCE in a solution with water and benzene and PCE for two years?

A. So a major problem of your plaintiffs' experts is they wave their hands like in a magic trick and say, oh, TCE causes NHL. They never tell us how much. And so if they want to believe that TCE causes NHL, they've got to come up with saying, gee, this is how much you need to drink, and this is what the Camp Lejeune plaintiffs did. I mean, that's among the major flaws for them.

If you don't think there's sufficient evidence of TCE in NHL, I don't know that any of them actually said they were sufficient. I think it was always this equipoise or as likely as not. But they've got to tell us what their high-quality study is that would -- that shows a dose-response relationship for how much it's gonna cause NHL from TCE exposure and extrapolate it back to the Camp Lejeune drinking levels. None of them have done that.

Q. So the answer to my question is, yes, BMI of 35 would be a higher risk then drinking water with TCE, benzene and PCE for two years?

MR. TUBIN: Objection to form.

A. At Camp Lejeune levels?

BY MR. TELAN:

Q. Yeah.

A. Or actually at any levels. I mean, I don't think there's sufficient evidence to say that TCE is causing NHL at any level of exposure, so they could literally be drinking it every day, and that's still not known as a risk factor, because occupational studies with much higher levels of exposure don't show that.

Q. And having now seen the Yu study, that doesn't change your opinions at all relative to benzene and its association with any of the cancers we talked about. True?

MR. TUBIN: Objection to form.

A. True. That Yu study has substantial problems. You know, you don't --

BY MR. TELAN:

Q. We've talked about those. I just want to know that was yes or no on that. That doesn't change your opinions that you've offered relative to any of the four cancers?

A. No. Based on its studies, it's a low weight, almost unhelpful study in the evaluation for what we're talking about today.

Q. I know you've published a good bit.

Have you published anything relative to the cause of renal cancer that's on your CV that you could point to?

A. Not that I recall.

Q. What about bladder cancer?

A. I believe I've had at least one bladder cancer publication with Paolo Vineis and aromatic amines, but that may be the only one that I'm recalling.

Q. Not involving any of the chemicals we're talking about?

A. That would be correct.

Q. In term of the ATSDR framework, I know that we discussed that earlier. The framework -- let me go back just a bit first. You had mentioned IARC has moved toward emphasizing biological plausibility now more heavily than it has in years past. True?

MR. TUBIN: Objection to form.

A. That is correct.

BY MR. TELAN:

Q. Now, the dose-response gradient in a Bradford Hill consideration, is that an absolute requirement for causality under the Bradford Hill analysis?

A. So I'm gonna say yes and then explain

that. It's an absolute requirement when you have a sufficient number of human studies, as we do with all the chemicals at issue here, except for maybe DCE, if you have human studies and a sufficient number of them, then you have to have those response.

Bradford Hill will say things like and others will say, well, you don't have to have all of them. You don't have to have that. But that's in the context of when you don't have studies that look at dose response.

But the consistency of the studies for what we're talking about, with the exception of benzene and AML and arguably the TCE and kidney cancer, for the other ones, you don't have that. So you can't just say, well, gee, I don't have to have dose response, but if the papers contradict the dose responses, which is what they do, you can't make a positive causation opinion.

Q. Is there -- I think I know the answer to this as well. Is there a threshold for each of the chemicals that we've spoken about in your mind that apply to their relationship to cancer?

MR. TUBIN: Objection to form.

A. So there's several studies of benzene in AML that are high quality. The levels of exposure

that measurably increase risk range anywhere from 16 ppm up to 200 ppm. I think the best representative studies are from NCI, which is the 40 ppm. That's the Hayes Linet group.

BY MR. TELAN:

Q. That goes back to what year, the 40 ppm?

A. Yes.

Q. What year does that go back to?

A. Well, it was first in the '97 paper from Hayes. And then for the TCE and kidney cancer, if you think that the case-control studies are more informative than the cohort studies, I'd have to go back to my table, but I think that was like either 30 ppm years or 300 ppm years. I'd have to go back specifically to the 2012 paper that shows different levels of exposure. Only the highest level of exposure was statistically increased.

Q. Is there a threshold level for smoking and lung cancer?

A. There isn't, because it's such an overwhelming exposure. People aren't inhaling all those carcinogens, like putting your head in a chimney and holding it in your lungs long enough to absorb the nicotine. There are studies that show that one to

four cigarettes a day increase risk.

And, by extension, to show you how strong cigarette smoking is for a lung carcinogen, environmental tobacco smoke is also a cause of lung cancer. So, you know, if you really want to know the threshold, you'd have to go back to, you know, the ETS studies, which actually poorly define exposure, but that's where you would have to think about where threshold would be for exposure to cigarette smoke.

Q. What about for breast cancer and smoking?

MR. TUBIN: Objection to form.

A. So it's kind of an interesting and complicated question that we've published on. So smoking overall is not a cause of breast cancer. If you divide the population based on their genetic susceptibilities for metabolizing aromatic amines, where about half of women metabolize one way; the other half are slow acetylators. One group is at risk. The other group decreases risk. We don't have a level of smoke that would increase risk for those lower.

Now, having said that, there's also a fair amount of studies that indicate passive smoke exposure is also a cause of breast cancer, and there's

some consistency there, but I think, again, the problem is, is that it's really hard to quantify passive cigarette smoke exposure for levels in terms of the risk of any cancer.

BY MR. TELAN:

Q. For smokers who see smoking, does the risk of developing AML continue for beyond 20 years after one stops smoking?

A. I have that information in my report. It does. I think it certainly goes down closer, but I think it extends out at least 20 to 30 years, which speaks to the idea that it's not just the benzene alone in cigarette smoke that's causing AML.

Q. Did you cite the atom bomb study in your report?

A. In any context?

Q. Yeah. I don't recall if I remember seeing that.

A. I'm pretty sure I did. I have one paper called "The late effect of atomic bomb radiation on myeloid disorders, leukemia and mild dysplastic syndromes." There's another one by Dale Preston on leukemia, lymphoma, myeloma. Another one again on lymphoma, myeloma by Nishiama.

Q. Do any of --

A. So there's at least a half a dozen in here.

Q. Do any of those studies speak to the latency period extending beyond 50 years with an increased risk for those patients having all forms of leukemia, even after 50 years?

A. My recollection, my recollection is only it being a risk for AML, but I could be misremembering that, and my recollection also is that, again, after 10 or 15 years, the risk of AML goes back to background post the atomic bomb survivors.

MR. TELAN: Give me two minutes.

THE WITNESS: Okay.

MR. TELAN: Go off the record.

VIDEOGRAPHER: We are now going off record. The time is 6:32.

(A recess was taken from 6:32 to 6:35.)

VIDEOGRAPHER: We are now back on the record. The time is 6:35. You may continue.

BY MR. TELAN:

Q. Dr. Shields, at page 95 of your report, this kind of follows up on the smoking discussion we were having, quitting. You mentioned, "One constituent of cigarette smoke is benzene. However, it should not be inferred that benzene is the only

driver for AML causation, such as modeled by Korte."

You go on to state, further down in that same paragraph, "Since cigarette smoking is not a known cause of lymphomas, the relationship to leukemia is more evident for 1,3-butadiene."

Did I read that correctly?

A. Yes.

Q. You didn't cite to any studies relating butadiene to leukemia in that section, did you?

A. I'm pretty sure I have cited some of those studies.

Q. Not in this paragraph to support that statement. True?

A. So I'm citing the IARC monograph on smoking, 100-F.

Q. Where is the cite to that?

A. It's at the bottom of page 95.

Q. 100-F?

A. Correct.

Q. Where are you reading? I'm just missing that.

A. So it says above, "Another known carcinogen of cigarette smoke is 1,3-butadiene that is classified by IARC as a known cause of hematolymphoid malignancies combined due to limited studies. The

subtypes are unclear, but IARC working group stated there is evidence, strongest evidence for leukemia and also indicates strong mechanistic report." And I'm citing Citation 199.

Q. So your, your support for the relationship from, for 1,3-butadiene to leukemia is cite 199?

A. Correct.

Q. And what, what forms of leukemia does 1,3-butadiene cause?

A. So, you know, there's not a whole lot of studies that isolate out human exposures, so we don't know. So IARC combined all the hematolymphoid and leukemias as saying strongest, but we don't really have good studies. That's an example where you don't have the epidemiology to make that clarification as opposed to the chemicals at issue that we're talking about today.

Q. And isn't that an issue that you take with our experts who've grouped leukemias together?

A. Yeah. But you're confusing things. I just said that for 1,3-butadiene, you don't have the human studies. Your experts have lots of human studies, many of which they didn't cite. They only cherry-picked.

But we have a very robust database for benzene, TCE, PCE and vinyl chloride. That's not the case for butadiene, so you don't have a -- you aren't able to separate that out, and that's stated in the IARC monograph.

Q. You would say there's a robust database for benzene and follicular lymphoma?

A. Less so. There's -- there's probably three or four studies for benzene and follicular lymphoma.

Q. What about TCE and follicular lymphoma?

A. I'd have to go back and look, but there's a whole bunch of studies of TCE and NHL.

Q. But as far as subtyping, your position is that it's inappropriate to suggest that a chemical can cause all subtypes of a particular blood cancer, correct?

A. No. You've mischaracterized what I've said. For the leukemia subtypes, leukemia types are extremely different. There's a wide variety of NHL types as well, but some are closer than others, and again, if you don't have the robust database for follicular lymphoma, for example, to use yours, you have to default to NHL. But if you have enough for NHL, you can't just default and say all NHL plus

leukemias can all be combined together. That's wrong. We do have limitations in science. We don't have a perfect world, and some databases are more robust than others.

Q. Is there evidence to show that benzene affects the hematopoietic stem cells that govern both lymphoid and myeloid lineage?

A. There are hypotheses around that. They're probably not correct, because you don't see that sort of crossover. So benzene -- you know, so there's different levels of stem cells, and so some are already differentiating towards a lymphoid, and some are differentiating towards the myeloid, and benzene is not affecting them the same way.

Q. Is there a progenitor stem cell that has both the myeloid and lymphoid lineage?

MR. TUBIN: Objection to form.

A. Yes.

BY MR. TELAN:

Q. And does benzene impact that progenitor stem cell?

MR. TUBIN: Objection to form.

A. That's almost impossible to study. It's not clear if, when you study stem cells, what progenitor stem cells you're actually looking at. So

the data is not clear for biological plausibility, since you don't see, you know, since we're struggling to show benzene is a cause of NHL, but we're not struggling to cause benzene causing AML. It's unlikely that is affecting that stem cell that can go one way or another. What's happening is you may be affecting it, but it's going towards the myeloid and the acute myeloid line.

MR. TELAN: I will conclude but hold the deposition open for review of the notes that you all are going to produce. And --

MR. TUBIN: We're going to review their discoverability and make a decision on the production.

THE WITNESS: And I just --

MR. TELAN: And I understand -- sorry. One second.

I understand your position. My position is that there was no objection raised to the production of those notes when they were asked for.

MR. TUBIN: That's not true. I objected on the basis of work product doctrine.

MR. TELAN: You haven't seen them, so

how can you raise an objection to something you haven't seen?

MR. TUBIN: I raised the objection. We need to evaluate them for discoverability.

MR. TELAN: I get that, but I don't think you can raise an objection in advance of having seen a document. I don't think that's an appropriate way to raise the objection.

So I think the question then becomes is should you have seen those documents in advance because of our request, and I think the answer to that is -- again, I'm not the judge, but I think the answer to that is yes, you should have, because we asked for all notes, and those notes have existed since that time of the request.

So I'll hold the deposition open. I understand it's your position that you'll review it for an objection, but I also want to hold it open to review the files that we still had not been able to open on the computer at least as of this morning at 9:30. I don't know if we've been able to crack the code on those things to this point.

BY MR. TELAN:

Q. And I'm sorry, Dr. Shields. I know you were going to say something, and it's probably, hey, I don't want to come back here and do this again. I get it. But I'm sorry to cut you off. I just wanted to make that clear.

A. I just wanted to say that just to clarify on one of the questions about radiation, you were asking about atomic bomb survivors causing other forms other than AML, and I said I didn't recall any. And just a quick glance at my report indicates not only time and form but other radiation forms of exposure. I've been associated with CML, so I was just gonna say the report speaks for itself as opposed to what I'm recalling.

BY MR. TELAN:

Q. Okay. And let me just ask this. As far as the latency, it extends out past 50 years for both AML and CML, correct?

A. I don't have anything in here about CML, and I don't think that it extends out again. I have to look at my report, but I think for AML, it's also the 10- to 15-year window.

MR. TELAN: Okay.

VIDEOGRAPHER: No further questions?

MR. TELAN: Not from me.

MR. TUBIN: Not from us.

VIDEOGRAPHER: All right. This adjourns the deposition of Dr. Peter Shields. The time on the screen is 6:44 p.m., and we are now off record.

MS. SPRAYREGEN: We do want a rough.

COURT REPORTER: Do you want a regular copy too?

MS. SPRAYREGEN: Yes.

COURT REPORTER: Are you ordering this?

MR. LEE: Yes. Whatever the norm is. Do we need a rough?

MR. TELAN: No.

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DEPOSITION ADJOURNED AT 6:46 P.M. EDT

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C E R T I F I C A T E

State of Ohio :
: SS
County of Hamilton :

I, Susan M. Gee, Registered Merit Reporter and Certified Realtime Reporter, a duly commissioned Notary Public in and for the State of Ohio, duly commissioned and qualified, do hereby certify that the within-named PETER GARY SHIELDS, M.D., was duly sworn to testify to the truth, the whole truth, and nothing but the truth.

I DO FURTHER CERTIFY that the foregoing is a verbatim transcript of the testimony as taken stenographically by me at the time, place, and on the date hereinbefore set forth, to the best of my ability.

I DO FURTHER CERTIFY that I am neither a relative nor employee nor attorney nor counsel of any of the parties to this action, and that I am neither a relative nor employee of such attorney or counsel, and that I am not financially interested in the action.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal of office at Cincinnati, Ohio, on this 4th day of June,

Susan M. Gee

_____
S/ Susan M. Gee, RMR, CRR
Notary Public, State of Ohio
Registered Merit Reporter
Certified Realtime Reporter

My Commission Expires: September 20, 2025

STATE OF OHIO :
: SS
COUNTY OF _____:

I, PETER GARY SHIELDS, M.D., do hereby certify that I have read the foregoing transcript of my deposition given on May 12, 2025; that together with the correction page attached thereto noting changes to form or substance, if any, it is true and correct.

_____
PETER GARY SHIELDS, M.D.

I do hereby certify that the foregoing transcript of the deposition of PETER GARY SHIELDS, M.D., was submitted to the witness for reading and signing; that after he had stated to the undersigned Notary Public that he had read and examined his deposition, he signed the same in my presence on this _____ day of _____, 2025.

_____
NOTARY PUBLIC - STATE OF OHIO

My commission expires: _____

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E R R A T A

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Federal Rules of Civil Procedure

Rule 30

(e) Review By the Witness; Changes.

(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.

(2) Changes Indicated in the Officer's Certificate. The officer must note in the certificate prescribed by Rule 30(f)(1) whether a review was requested and, if so, must attach any changes the deponent makes during the 30-day period.

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VERITEXT LEGAL SOLUTIONS

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