SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF LOS ANGLES CENTRAL JUSTICE CENTER

- - -

WILLIAM HEAD and LAURA HAMMOND, Plaintiffs,	)	
vs.	)	Case No. BC358265
CHEVRON CORPORATION; CHEVRON U.S.A. INC.; et al., Defendants.	)	

DEPOSITION OF

DAVID W. PYATT, PH.D.

Long Beach, California

June 28, 2010

ATKINSON-BAKER, INC.
COURT REPORTERS
(800) 288-3376

REPORTED BY: CARRIE LAMONTAGNE, CSR No. 13393

FILE NO.: A404A4C

SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF LOS ANGLES CENTRAL JUSTICE CENTER

- - -

WILLIAM HEAD and LAURA HAMMOND, Plaintiffs,	)	
vs.	)	Case No. BC358265
CHEVRON CORPORATION; CHEVRON U.S.A. INC.; et al., Defendants.	)	

Deposition of DAVID W. PYATT, PH.D.,

taken on behalf of Plaintiffs, at 401 East Ocean Boulevard, Suite 800, Long Beach, California, commencing at 12:21 p.m., Monday, June 28, 2010, before Carrie LaMontagne, CSR No. 13393, a Certified Shorthand Reporter in the State of California.

A P P E A R A N C E S:

FOR Plaintiff:

METZGER LAW GROUP
BY: RAPHAEL METZGER
401 East Ocean Boulevard
Suite 800
Long Beach, California 90802

FOR Defendants:

STEPTOE & JOHNSON, LLP
RUTH D. KAHN
633 West Fifth Street
Suite 700
Los Angeles, California 90071
BY: STAN PERRY, Esq., Haynes and Boone, LLP, specially appearing

I N D E X

WITNESS: DAVID W. PYATT, Ph.D.

EXAMINATION:	PAGE
BY MR. METZGER	7

E X H I B I T S

PLAINTIFF'S	DESCRIPTION	PAGE
1	Handwritten notes	8
2	Handwritten notes entitled, "Reviewed"	8
3	Handwritten notes entitled, "Bibliography"	9
4	CD	9
5	Handwritten notes entitled, PubMed, Every week"	10
6	Document entitled, "Materials Provided to David W. Pyatt, Ph.D. (Defense Expert)"	11
7	Curriculum Vitae	11
8	Invoice, dated January 12, 2010	12
9	Deposition Testimony	13
10	Article entitled, "Acute Myeloid Leukaemia and Exposure to Organic Solvents - A Case-Control Study"	21
11	Article entitled, "Occupation, Hobbies, and Acute Leukemia in Adults"	22
12	Article entitled, "Occurrences	22

	Socioeconomic and Occupational Groups in Sweden"	
13	Article entitled, "Occupational Risk for Hematological Malignancies"	22
14	Article entitled, "Chemico-Biological Interactions"	23
15	Article entitled, "Occupational History and Exposure and the Risk of Adult Leukemia in Shanghai"	23
16	Spreadsheet entitled, "PainterEpiAML"	24
17	Spreadsheet entitled, "Solvents and AML"	24
18	Spreadsheet entitled, "Toluene and AML"	24
19	Article entitled, "Chemico-Biological Interactions. In press."	45
20	Chromosome Analysis	51
21	Karyotype, Cell 2	52
22	Karyotype, Cell 3	52
23	Karyotype, Cell 4	52
24	Karyotype, Cell 7	52
25	Karyotype, Cell 8	52
26	Karyotype, Cell 11	52
27	Article entitled, "Risk Analysis"	86
28	Article entitled, "Environmental Exposures in Cytogenetically Defined Subsets	121

		Leukemia"	
	29	Article entitled, "Occupational History and Involvement of Chromosomes 5 and 7 in Acute Nonlymphocytic Leukemia"	121

DAVID W. PYATT, PH.D.,

having been duly sworn, was

examined and testified as follows:

EXAMINATION

BY MR. METZGER:

Q Would you introduce yourself for the record, please.

A David Pyatt.

Q Good morning, Dr. Pyatt.

A Good morning.

Q We've done this a few times before, haven't we?

A Yes.

Q Okay. You know the rules and regulations and admonitions and all that stuff, don't you?

A I do.

Q Okay. Have you written out your opinions for this case?

A You know, I did. I did last night so that we would have kind of an outline. I had them on the computer, but I left it at home; so then from my memory, I jotted those down this morning. So, hopefully, you can read it.

Q This single sheet of paper?

A Yes.

Q We'll mark this single sheet of paper with your opinions on it as Exhibit 1.

(Exhibit 1 marked)

BY MR. METZGER:

Q And do you have any notes for this case?

A Notes, no -- well, I guess I made a list of things that I have reviewed. I made a list of -- a bibliography. I mean, this is handwritten. We discussed one time in the past about how I do literature searches, so I made a list of that.

Q All right. When we get into these, we'll mark them.

A Okay. Let's see --

Q So this is your handwritten list of materials that you reviewed, correct?

A Yes.

Q And that will be marked as Exhibit 2.

(Exhibit 2 marked)

THE WITNESS: There are other things that I haven't added to that.

BY MR. METZGER:

Q Well, we will get to that. That's okay.

A Sure.

Q And you have a sheet here called, "bibliography"?

A Yes.

Q Which is how you go about doing research; is that correct?

A When we start discussing my opinions, there would be literature that will fall out into those categories; and then they are on this CD, which I made for you, and these will be the headings of the folders that you will find the literature on the CD.

Q Let's mark this bibliography sheet Exhibit 3. And the CD will be Exhibit 4. So let's put it on the CD itself. It doesn't hurt anything, does it?

(Exhibit 3 marked)

MR. PERRY: No.

THE WITNESS: No, that's okay.

MR. PERRY: As long as it's not on the top.

MR. METZGER: So it's safe inside that circle.

BY MR. METZGER:

Q All right. So CD. And it has literature on it?

A Yes.

Q Okay.

A The last time I did it for you, I just had 200 references and it alphabetized them. This one -- they

are in manila folders so you will be able to get to them easier.

Q All right. What else do you have there?

A This is a list of stuff that has been provided to me. This is a handwritten list. I don't even know if you want this or not, but I do literature searches on a weekly basis, and that's what this list is -- are all the things that I get updated on weekly. So any new publication that comes out in Pub Med on any of those categories shows up in my in-box every Sunday.

Q Okay. We'll mark that, a handwritten sheet, Exhibit 5.

(Exhibit 5 marked)

THE WITNESS: And then if you care, these are examples of those that came this week.

BY MR. METZGER:

Q Let me just see.

A So it will give you the topic up here, the date that it shows up, and it constantly updates -- so whatever has been newly published in the last week.

Q So these just automatically pop into your in-box?

A Correct. I set the criteria through the -- I guess it's the National Library of Medicine website.

Q Are there any particular articles on here that

you're relying on?

A No. These are just the ones that came today.

Q Then I won't need to mark that. But I would like this list to mark. And as I understand, this is a list of materials prepared by the Steptoe and Johnson firm of what they sent to you in this case?

A Correct.

Q That will be marked at Exhibit 6.

(Exhibit 6 marked)

BY MR. METZGER:

Q Any other notes that you prepared?

A No. That's all I have.

Q Okay. We might as well mark some other things. This is your current curriculum vitae?

A Yes.

Q We'll mark that as Exhibit 7.

(Exhibit 7 marked)

BY MR. METZGER:

Q And you have a rate sheet there?

A This is an invoice.

Q An invoice. Not for me, I hope.

A No, but you pay quicker than anyone else.

Q I do?

A Yes.

Q Good.

All right. And is this only billing that you've prepared for this case?

A Yes.

Q That will be marked as Exhibit 8.

(Exhibit 8 marked)

BY MR. METZGER:

Q I notice that this is an invoice from January of 2010.

Have you done work since then?

A Yes.

Q But you have not prepared any invoices?

A No. Most of it occurred this month in preparation for today, so I'll probably send them an invoice at the end of June.

Q Approximately how many hours have you worked on this case since the work that's reflected in Exhibit 8?

A I'm going to estimate 40 hours.

Q Okay. And that's all billed to Steptoe at $300 per hour?

A Yes.

Q What else do you have there?

A I think I was supposed to bring that.

Q Yes, your list of deposition testimony. So that will be marked as Exhibit 9.

(Exhibit 9 marked)

BY MR. METZGER:

Q And what else have you?

A That's it.

Q Okay.

A Well, I do have -- but I think Stan gave you -- Mr. Perry gave you these as well. These are all the e-mails.

Q I have a collection of e-mails and some correspondence here.

A Yeah, that's all this is. And you can have my copy, too, if you'd like.

Q No. Hold on to that for now. That's fine.

A Okay.

Q Let's get started. Would it be helpful to you if I got a copy of this?

A That would be great.

MR. PERRY: Would you make me a copy?

MR. METZGER: Of course. You don't need to ask, Stan.

(A break was taken)

BY MR. METZGER:

Q You have, it looks like here, six major opinions?

A Yes.

Q Why don't you tell me what the first one is?

A That this is not a benzene case in that Mr. Head never worked with or around pure benzene. He was exposed to -- peripherally, I guess to various solvents, naphthas, toluene. And when you look at the literature, the epidemiological literature, the toxicological literature on those substances that always contain some small amount of benzene, they're not carcinogenic or even hematotoxic. So that's pretty much what that first opinion is.

You want to talk about that one or just go through them?

Q Let's talk about that one, and then we'll go on.

A Okay.

Q Could you direct me to any epidemiologic study or case report in which the rule concerning benzene and leukemia where the persons who developed leukemia were exposed to pure benzene?

A That's a fair question. The only one that I think would come close to that would be the Pliofilm workers where they were -- well, no, that's not true. The Pliofilm workers were using benzene as a solvent, a lot of the shoe worker studies were using pure benzene as a solvent. So ACCOI's studies would be people

exposed to pure benzene in the glues.

In fact, in ACCOI'S work, when they stopped using benzene as a solvent and replaced it with toluene, the disease rate went away. They stopped seeing leukemias, stopped seeing aplastic anemias, which is a pretty good natural experiment, in my view, that the toluene clearly did not carry the same risk that the benzene did.

Q Have you ever seen any laboratory analytical reports to establish that the so-called benzene that was being used in the Pliofilm cohort or by the Turkish shoemakers was actually pure?

A No.

Q Okay.

A I mean, they called it benzene.

Q Well, let me ask you, Are you aware that, historically, solvents called toluene could contain as much 30 percent benzene?

A Yes.

Q And are you aware that, historically, a solvent called benzene could contain 5, 10 percent toluene and some xylene and ethylbenzene as well?

A That wouldn't surprise me. It would depend on the process that they used to obtain the benzene. The toluene, I have seen old studies, '30's, '40's, where it

might have contained -- I've never seen 30 percent, but I wouldn't quibble with that. I have seen high levels of benzene in the toluene, but that is definitely a historic fact. You certainly do not see that anytime in the last 20 or 30 years. The levels of benzene have been very low in toluene.

Q And is it true that, at least historically, benzene was a very cheap solvent and that industry would, on occasion, just blend it into other solvents essentially to get rid of it?

MR. PERRY: Objection. Assumes facts not in evidence.

THE WITNESS: I don't know how to answer that. I don't know that that's true or not.

BY MR. METZGER:

Q Okay. Is it your opinion that benzene-containing solvents are not carcinogenic or leukemogenic?

A It's my opinion that toluene and the VM and P naphthas and mineral spirits and Stoddard solvent that contain low levels of benzene are not carcinogenic. Now, you could conceivably make a solvent that had 20 or 30 percent benzene in it. There's nothing magical about the fact that benzene's in a solvent or not in a solvent. It's still going to require a certain

cumulative exposure to increase your risk of leukemia.

You could have that from a solvent or from pure benzene. But these solvents do not have enough benzene in them to increase, meaningfully, the risk of leukemia. That's why IARC, ACGIH, ATSTR, none of those regulatory groups, even though toluene and DM and P naphtha has benzene in it, they do not regulate them as carcinogenic substances.

Q What reference are you able to provide me that that's the reason that they don't regulate them as carcinogenic substances?

A I don't understand that question. They are not carcinogenic. That's why they don't regulate them as carcinogens.

Q Well, you would agree with me, would you not, that the toluene molecule differs from the benzene molecule?

A Not by much; but, yes, it does.

Q Right. It has a unit that's called methyl group, right?

A A methyl group, yes.

Q And would you agree with me that the toluene molecule is not carcinogenic?

A Yes.

Q Would you agree with me that the benzene

molecule is carcinogenic?

A Not the way you worded it. It takes a lot of benzene molecules before it's carcinogenic.

Q Right. But the molecule has the property of being at some dose and concentration -- and people can differ about that. The benzene molecule has the ability or capability at certain -- in certain circumstances of being carcinogenic; whereas the toluene molecule, no matter how many of them you put together, is not carcinogenic, right?

A That's true.

Q And regarding the IARC classifications, how do you know that when IARC classifies toluene, for example, as not being a known human carcinogenic -- I don't know what they do classify it as, but whatever it is -- how do you know that they're not classifying it based upon the nature of the molecule, in other words, its innate property?

A That's not -- they're classifying it based on the epidemiologic and the experimental evidence that exists. It's not a theoretical construct where they are looking at the molecule. They are looking at studies where people have been exposed to toluene, and animal studies where people have -- where animals have been exposed to toluene, and there's benzene in that toluene;

there always is. So they're basing it on the fact that there is no experimental evidence that toluene, with a little of benzene in it, causes cancer in laboratory animals.

Q Now, in any of the animals studies that you are referring to regarding toluene, did -- were there any analyses done of the toluene that was used in those studies to determine whether there was a benzene component to it?

A They didn't describe the analysis, but they didn't specify that this was pharmaceutical-grade toluene, and even pharmaceutical grade would probably be too expensive to use in these studies. Even there, there's going to be some benzene in it.

Q But none of those studies actually provide that analysis, to your knowledge?

A They didn't say exactly how much is in there.

Q Okay. All right. Now, when you -- so you're relying for your first opinion on the IARC monographs; is that correct?

A Well, that would be part of it. There's also -- there's painter studies. NIOSH just published a large study of painters. And these guys were working with toluene as a solvent, and there's no increased risk of leukemia. There's epidemiological studies. IARC

just compiled that and made a decision that I think is consistent with my interpretation of that literature.

But no, it's not the only thing that I'm basing that opinion on.

Q Well, that's what I'd like to know. Other than -- so you're basing it on the IARC monographs?

A In part.

Q And that would be the monographs for toluene, xylene, naphtha?

A Mineral spirits, Stoddard solvent.

Q And what other -- and you're also basing it upon the epidemiology literature?

A Correct.

Q For different exposed groups?

A Yes.

Q Cohort studies?

A Correct.

Q You're basing it on case-control studies, as well, or not?

A Probably. There's probably some in there.

Q Which case-control studies are you basing your opinion on?

A I would have to go -- it's on that disc. I don't know. I don't have them memorized. We can print them out if you'd like, and then we can talk about them.

Q Well, I think what we will do during a break is print out the file listing, rather than printing out all the items.

A Yeah, that's what I meant.

Q It takes some time.

A That's what I meant. I brought a hard copy of some, by no means all. So here is an ACGIH --

Q Let me just see them.

A It's not an exhaustive list or all-inclusive.

Q So you have basically EPI studies of painters and --

A Gasoline-exposed workers.

Q All right. Well, you know, I'm going to mark a few of these. There's a study that you have here by Lazaro, correct?

A Uh-huh.

Q And we'll mark that as Exhibit 10.

(Exhibit 10 marked)

BY MR. METZGER:

Q Toluene is there.

And you're saying that all these are on the disc?

A Yeah, and then some.

Q Okay. There's a study here by Terry that we'll mark as Exhibit 11.

(Exhibit 11 marked)

THE WITNESS: I think that's a case-control study.

BY MR. METZGER:

Q Yeah. There's a study by somebody named Ji, spelled J-I. I'm not familiar with that one, so let's mark that one as Exhibit 12.

(Exhibit 12 marked)

THE WITNESS: I have one you haven't seen?

BY MR. METZGER:

Q I think so. Maybe I have it. It just doesn't look familiar.

As long as we are talking about case-control studies, let's mark that one as Exhibit 13.

(Exhibit 13 marked)

BY MR. METZGER:

Q I haven't seen this. I will copy it rather than marking it.

A It's old. This one is old.

Q Yeah, I assumed that.

A You know, I have -- this is out of Wong's -- I just printed out the table, but I have the whole paper in another pile, if you want it. I'm sure you have it; but if you want to mark it as an exhibit, I can give you the whole paper.

Q Yeah. If you do, it's better that we mark the

whole thing.

Oh, here it is. So we'll mark this one as Exhibit 12 -- sorry, we'll mark this Wong paper, a hospital-based case-control study of AML in Shanghai, as Exhibit 14.

(Exhibit 14 marked)

THE WITNESS: You may have to give me that Wong paper back if you're going to discuss it.

BY MR. METZGER:

Q Sure. That's fine.

You have the Adegoke, A-D-E-G-O-K-E, paper, which we will mark as Exhibit 15.

(Exhibit 15 marked)

THE WITNESS: That's the big NIOSH-sponsored painter study.

BY MR. METZGER:

Q Shoe manufacturing?

A Yeah, sorry.

Q That's okay. And there's a list here, painters and AML --

A Oh, those are -- I mean, you can have them, if you want them; but they are just where I keep track of the literatures.

Q Let's mark them. So your list of studies on painters and AML will be Exhibit 16, solvents and AML

will be 17, and toluene and AML will be 18.

(Exhibit 16 marked)

THE WITNESS: For the record, those are works in progress. They may not be completely up to date.

BY MR. METZGER:

Q Okay. We've already marked more than I thought we would.

All right. So you are -- let me ask you, Regarding your first opinion, you say that these solvents are not hematotoxic even though they always contain benzene.

Have you read studies where workers exposed to toluene and naphtha did develop hematotoxicity.

A It's very rare. There are a couple of studies that would fall into that same time frame that you were discussing where toluene had 20 percent benzene. There are a couple from that era -- 1940's or something. I've see a couple of old studies, but nothing in the last 30 or 40 years.

Q And you would agree that in those studies, the authors recognized that the hematotoxic effect of what was exposure was due to the benzene within the toluene, correct?

A Right, when it was at 20 percent.

Q Have you also read animal studies in which

animals were exposed to toluene and they developed hematotoxicity?

A No.

Q But if you -- if there were such a study, you would assume that the hematotoxicity from giving the animals the toluene would be due to benzene contamination of the toluene, right?

MR. PERRY: Objection. Assumes facts not in evidence.

THE WITNESS: Yeah. It would depend on what the hematotoxic effects were. But I would have to look at the study to interpret it.

BY MR. METZGER:

Q You would not attribute such effects in animal studies to the toluene itself, correct?

A Well, I mean I think that those studies are negative, which is why no one thinks toluene is hematotoxic.

Q All right. So I think that covers your first opinion, at least for now.

Moving on to your second opinion. You have three words here -- or actually not even -- two words and an abbreviation. As I see it, it says, "Not enough BZ." And I assume that's benzene, right?

A That's correct.

Q And by that, is that your shorthand for saying, then, in your opinion that Mr. Head was not exposed to enough benzene to have caused his AML?

A That's a very good way of putting it, yes.

Q Okay. How many molecules of benzene does one have to be exposed to to develop AML?

A A lot.

Q How many?

A A lot.

Q Can you tell me how many?

A I could with 30 minutes and a calculator using Avogadro's number and how many grams of benzene it would take to approximate 40 PPM years. I mean, that math can be done, and it would be gazillions, lots and lots and loss of zeros.

Q When you say "gazillions," you're not referring to the expert, are you?

A Oh, Ghazalian. No. No, Ghazalian isn't -- let's try for -- well, lots of zeros. I don't even know what the word would be.

Q Okay. I'm gathering from what you have said that it's your opinion that it takes 40 parts per million years cumulative dose of benzene to cause AML?

A I think that is a fair interpretation of the literature, but even that --

Q Well, I'm not asking you about the literature. Is that your opinion?

A Yes, that's my opinion, based on the scientific literature, with the caveat that I think the literature -- and this is another one of these opinions we can discuss when we get to it -- but even that is not all there is to the equation, and that those exposures have to have occurred within a 10- or 15-year window prior to diagnosis.

Q Okay. We'll talk about that, too. But let's stick now with dose, and then we will get to latency or etiologic window as well, as you like to call it.

I tried using that word with other experts, and nobody else would accept it, by the way.

MR. PERRY: Etiologic window?

MR. METZGER: Yeah, his term. So I stopped using it.

MR. PERRY: I like it. Everybody wants to refer to it as something other than latency. They have their own key terms.

THE WITNESS: Sorry I've led you stray. You and I know what we're talking about.

MR. METZGER: They do, too. But they didn't want to call it that for some reason. I don't know.

///

BY MR. METZGER:

Q Anyway, let's just stick with dose for now, and we'll reserve latency. I'm going to have to talk to you about that.

So let me ask you, It is true, is it not, that there have been epidemiologic studies published which have reported significantly increased rates of AML for cumulative doses less than 40 part per billion years benzene, true?

A Well, the only one that I think of that has meaningful quantification of the dose -- and I can't even think of any that don't have -- you know, that I would say really isn't that meaningful would be Deborah Glass's, the Health Watch study, and no, I don't interpret her findings to necessarily be inconsistent with the 40PPM year kind of ceiling or threshold.

Q I'm not asking you about threshold though.

My question was, It's true, is it not, there have been epidemiologic studies published in the scientific peer-review literature reporting significantly increased rates of AML for cumulative benzene doses of less than 40 part per million years? That is true, isn't it?

A I can't think of any, sitting here.

Q Is it true that such studies -- let me

rephrase.

It's true, is it not, that there have been studies published in the scientific peer-review literature reporting significantly increased rates of leukemia at cumulative doses of benzene less than 40 part per million years?

MR. PERRY: Objection --

THE WITNESS: That, I think, is -- which Deborah Glass's work would fit into that category, yes.

BY MR. METZGER:

Q Do you know of any other studies reporting that, other than Deborah Glass?

A I can't think of any sitting here.

Q Okay. When you say "Deborah Glass," are you referring to her 1993 study?

A 2003.

Q I'm sorry, 2003.

A Yeah, the Health Watch.

Q Published in the American Journal of Epidemiology?

A That sounds right.

Q All right. Separate and apart from cumulative dose, do you have an opinion whether short-term intermittent exposures to benzene can, in some circumstances, cause AML?

MR. PERRY: Objection. Form. Vague.

THE WITNESS: That is exactly Opinion 6 --

BY MR. METZGER:

Q Okay.

A -- when we're talking about intermittent peek versus cumulative.

Q I hold it for then, then. Okay.

All right. So let's see, your third opinion -- why don't you tell me what that is.

A The cytogenetic abnormalities that Mr. Head displayed in his AML are not specific enough to definitively indicate etiology. And then recent studies indicate that minus five and/or minus seven are not associated with benzene exposures.

Q Okay.

A So, basically, this is getting at the notion that you can look at Mr. Head's cytogenetic profile, or any other one for that matter, and say that that's all you need to see to know that it was caused by benzene. I don't believe that's the case.

Q Let's talk about this. When you say his cytogenetic abnormalities are not specific enough to definitely indicate etiology, what do you mean they are not specific enough?

A That you see monosomy 5, you see a

interstitial deletion in the long arm of chromosome 5, 5q, 3, 1. Monosomy 7, an interstitial deletion of chromosome 7, monosomy 8, trisomy 8, all of these different cytogenic lesions, you see them in people that have no occupational exposure to anything. So they occurred in de novo cases all the time. So you cannot look at those cytogenetic changes and say this is an absolute hallmark of an occupational or a benzene-exposed person.

Q I think I understand what you mean now.

Isn't it true that everyone who has developed a 5q minus has been exposed to benzene?

A Yes. We've all been exposed to benzene. We're exposed to benzene all the time.

Q And isn't it true that everyone who has developed a monosomy 7 has been exposed to benzene?

A By the same line of reasoning.

Q Would you agree that the 5q minus chromosome abnormality is more frequently found in -- among people who have a genotoxic exposure than people who do not?

A I'm not quite sure how to answer that.

But in therapy-related leukemias -- and then I guess you can say that was a genotoxic exposure with the alkylating agents -- in those cases, you do see a higher frequency of monosomy 5 or 5q, 3, 1 or some other break

on chromosome 5, with a higher frequency than you do in de novo cases.

Q And regarding benzene AML, isn't it true that there's also an increased frequency of abnormalities of chromosome 5 that you mentioned amongst exposed workers than nonexposed?

A Could you repeat that? I think you started with AML in that --

I'm sorry, could you read that question back?

(Record read)

MR. PERRY: Objection. Vague.

THE WITNESS: That's a lot harder to demonstrate. You can show in the test tube, in vitro, that benzene metabolites can cause 5q, that interstitial deletion under certain specific conditions. You can show in healthy workers that have been highly exposed to benzene -- you can see that chromosomal abnormality in the peripheral blood of those workers.

Whether or not you see that in an AML that is ostensibly caused by benzene, that's much more difficult to say with any certainty. And that was what Dr. Wong just published in his large case-control study where he divided out all the AMLs according to the World Health Organization classification system, and he didn't see it. There was not an increase in the cytogenic changes

in those AMLs that were highly exposed to benzene.

So the biggest and newest study on this very issue does not support that 5 and/or 7 are chromosomes that are associated with benzene exposure.

BY MR. METZGER:

Q In AML patients, you're saying?

A Right. In people with AML, that's correct.

Q Okay. Is the statement that you just made also, in your opinion, true of monosomy 7?

A Yeah. I think that would -- I mean, monosomy 7 clearly has a genetic component. You see it in people with Down's Syndrome. You see it in kids that develop MDS. You see it in kids that develop AML. You see it in all kinds of de novo cases.

You can see -- there are a couple of studies that Martin Smith's group have done to show that either trisomy 7 or monosomy 7 is elevated in the peripheral blood of these highly-exposed benzene workers. As far as in benzene-related AMLs, if that's, in fact, what Otto Wong was investigating, you do not see it.

Q Are there any studies, other than the recent study by Otto Wong, that you believe supports your opinion that abnormalities of chromosomes 5 and/or 7 are not associated with benzene exposure?

A Yes.

Q What are those studies?

A Here is one by Dr. Crane, "Environmental Exposures in Cytogenetically Defined Subsets of Acute Nonlymphocytic Leukemia." And on Table 4, "Occupation at Diagnosis," and then they have minus 5, minus 5q. There were none in the exposed minus 7, minus q. There were, again, none in the exposed group. So that one does not support that 5, 7 is associated with exposures.

Here's one by Mettleman, and in the exposed category -- well, they don't really do any statistics, but there were two cases with monosomy 7. So that one probably would go in the positive pile. But there's no -- that one is a petroleum workers.

Here's a study by NAROD, N-A-R-O-D, "Occupational History in Involvement of Chromosome 5 or 7," and there is a Table 4, "Any involving chromosome 5 or 7 by exposure." There's a category for chemicals, and the relative risk is 0.91. There's a category for petroleum products, and the relative risk was 0.79. So this one does not support that 5 or 7 have anything to do with occupational exposures.

These are all the in vitro studies.

And then even though it was -- it was myelodysplasia, Rick Irons' study where he did a case/case analysis of the MDS cases and went in a

priority, thinking that he was going to see an increase in 5 or 7 and did not in these MDS cases that were highly exposed to benzene. So while it's MDS not AML, that one doesn't support it as well.

Q Okay. And you're referring to Irons' 2010, I-R-O-N-S, 2010.

A I just have the impressed one, and I tried to pull it up last night and my library was down, so I couldn't get you the actual.

Q That's okay.

A I'm sure you've seen it.

Q I'm not sure I've seen it. But in any event --

A It just isn't formatted in the same way as it is in the journal.

Q Okay.

A You can have that.

Q We'll get a copy.

Any other studies that support your opinion that 5 and 7 chromosome abnormalities are not associated with benzene exposure and AML?

A I can't -- no, I mean, the rest of these are kind of in vitro studies. And I think, really the point of all of that is that you can't use the cytogenetic abnormalities as a hallmark of benzene exposure. I just

don't think that's supportable based on the total collective literature that exists right now.

Q Okay. So let me -- let's talk about the three studies that you've mentioned.

A You'll have to give them back to me if we're going to talk specifics. There was Rich's. And the third one was, I think --

Q Well, where is the Wong's?

A Wong's.

Q I bet it's in this pile here. Here it is.

A No. You marked it as an exhibit.

Q I did?

A Yeah. Remember, we talked about that?

Q Yes, I did. Okay. All right. First, let's talk about the older studies, NAROD and Crane.

Would you agree with me that the data that you mentioned to me from these studies was not statistically significant?

A Well, what I'll agree is that in the Crane study, when he looked for a change in 5 or 7, there were no cases in the exposed and there were several cases in unexposed. So you can't do statistical analysis if you don't have any cases. But if you did do that, then the relative risk would be, you know, infinity, saying that the unexposed had higher than the exposed.

Q Statistical significance and relative risk are different concepts, aren't they?

A Yes.

Q Yeah. I'm not talking about relative risk. I'm talking about statistical significance here.

Would you agree with me that the data you referred to in the Crane study is not statistically significant?

A No, I would not agree with that. I would agree that they did not do statistical analysis because there's no cases in the exposed group.

Q Okay. And is there a protocol for determining statistical significance in the absence of cases in either the exposed or comparison group?

A I don't know. That's a good question. I don't know the answer. But if you look at it another way, if you took this finding, they have zero cases in the exposed and five cases in the unexposed. And you said, "Okay, whoops, there was one," so now it's not zero. You've actually found a case in the exposed group. You'd have one divided by five, and that probably would be statistically significantly suppressed, decreased.

Q Well, that's what I'm getting at. Can you do that calculation and actually determine whether that --

assuming that there was one case whether they would be statistically -- the difference would be statistically significant?

A No, not in my head. And it is a very small number of cases, which I think is what your point is.

Q Well, that's another point. I agree with you.

What about the NAROD study, is the data that you showed me in the -- that you referred me to in Table 4 in the NAROD study statistically significant?

A They did statistics on it. It's not statistically significantly suppressed, and I never made that claim; but it clearly is not elevated.

Q I understand. So I'm gathering that you consider it appropriate to consider, as a basis for your opinions, data which is not statistically significant, correct?

MR. PERRY: Objection. Assumes facts not in evidence.

THE WITNESS: I wouldn't agree with that, necessarily.

BY MR. METZGER:

Q Well, you're doing that, at least with respect to the NAROD study, correct?

A Well, no, because the NAROD study is purporting to look to see if these things were

associated with occupation, and they were not. I'm not -- they're not statistically significantly suppressed. But that data clearly indicates that those cytogenetic lesions were not associated with the exposures studied in that paper.

Q But you believe that that -- this paper supports that, even those data are not statistically significant?

A Well, it's the -- that's the null hypothesis. The null hypothesis is there's not a difference between the exposed and the unexposed with regard to those cytogenetic changes. I think that data clearly supports the null hypothesis.

Q Even though that data is not statistically significant?

A Well, that's what that does.

Q Is that what you're saying?

A It's -- the relative risk would be one.

Q I'm not talking about the relative risk. I'm talking about statistical significance.

Are you telling me that you consider that study to support the null hypothesis, even though the data is not statistically significant?

A That doesn't make any sense. The null hypothesis would be that the relative risk would be one,

that there's no difference between those two.

How can it possibly be statistically significantly different if there's no difference between those two? That's completely illogical.

Q You think?

A I do think.

Q Well, I guess I've been put in my place.

A Sorry.

Q Now, let's take a look at Iron's -- I'm sorry, the Long study.

A Okay.

Q Where is the data in this study regarding chromosome 5 and 7 that you're referring to?

A Yeah, what he did in here --

MR. PERRY: Can you refer to the year just because, obviously, there's tons of Wong studies.

THE WITNESS: Okay. It's a hospital-based case-control study of acute myeloid leukemia in Shanghai, analysis of environmental and occupational risk factors by subtypes of the WHO classification. And it was published in Chemico-Biological Interactions, 2010.

So what Dr. Wong did was he used the WHO criteria for AML subtypes and evaluated the risk factors for benzene as well as toluene and xylene and paint

thinners and mineral spirts and all kinds of things that are quite relevant to this case, and none of those were statistically significantly elevated with different forms of AML. But in terms of benzene and monosomy 5 or 7 where those would be part of the diagnoses, would be in the AML MD category. And those are -- they're highlighted in yellow there.

BY MR. METZGER:

Q So you're referring to Table 6, correct?

A Okay. I didn't look at the table.

Q Is that correct?

A Yeah. I'm sorry, yes.

Q Okay. So you're referring me to the column which is labeled "AML, hyphen, MD," correct?

A Correct, yes.

Q And what is that standing for?

A AML, multilineage dysplasia or another synonym for is AML with myelodysplastic characteristics. I'm not sure how the World Health Organization describes it.

But he went through and characterized all the cytogenetic changes and have those listed in Table 2, I think, in that paper. And then some, like, in Version 16 and 821 translocation, 1517 translocation, those would fit into the RCA category. Monosomy 5 or monosomy 7 are not considered recurring genetic alterations or

abnormalities.

Q So you're saying it's Table 2 that discusses the cytogenetics?

A Yes. I think. Is that right?

Q Well, Table 2 is distribution of acute myeloid leukemias cases by subtype, according to the WHO 2001 classification.

A Okay. And then underneath the RCA are there Inversion 16 and 821.

Q Yes, there are.

A Okay. That's the one.

Q But what I'm not seeing anywhere is any discussion whatever of abnormalities of chromosomes 5 and 7.

A Because they didn't see them. They weren't there.

Q Where is the data showing that there were none?

A Well, all I can tell you is that if they were there, they would have shown up in the AML MD category because that's were monosomy 5 and monosomy 7 would be part of the diagnostic criteria for that subtype.

Q Under WHO?

A Correct.

Q Well, that's interesting because I was looking

at AML MD, that's AML with multilineage dysplasia. The criteria for that do not require any specific chromosome abnormalities.

Would you agree with that?

A I agree with that. But you frequently see 5 or 7 in there.

Q As a matter of fact, the World Health Organization classification system doesn't have any classification -- any subcategory of AML with abnormalities of chromosomes 5 and 7.

A That's true.

Q Let me ask you this: As a matter of fact, is it true that this article doesn't even mention chromosomes 5 and 7?

A I'm not sure about that. I'd have to go back and read it, whether it's not in any of the discussions or anything. But no matter how you interpret it -- go ahead.

Q Have you spoken with Dr. Wong about this study?

A I have, not about this question.

Q What have you spoken with him about this study?

A We just chatted at the Munich meeting about his presentation and --

Q But you haven't specifically discussed the issue of chromosome abnormalities 5 and 7 in this study?

A No.

Q Okay. Would you agree with me that generally the presence of abnormalities of chromosomes 5 and/or 7 in an AML, in someone with an occupational history of exposure to benzene-containing solvents, supports rather than does not support causation?

MR. PERRY: Objection. Vague.

THE WITNESS: I think if you're -- if you carefully evaluate that question, it's going to be hard to make a determination. I think a year ago, I would have probably said yes; but these recent studies out of China no longer really support that 5 and 7 are benzene-related cytogenetic changes. So I wouldn't say they are inconsistent.

BY MR. METZGER:

Q Would you say they are consistent with --

A I would say the data is too fuzzy to really be able to use those changes.

Q Okay. So your opinion is changed because of this Wong study?

A And Rich Irons' study.

Q Which study of Rich Irons'?

A The MDS case/case analysis where he went in

and specifically looked for cytogenetic changes and didn't find any.

Q Okay. I guess we better mark that study, too, then. We'll mark that one as Exhibit 19.

(Exhibit 19 marked)

BY MR. METZGER:

Q Why don't you show me where and what it is in this study that is support of that.

A Okay. "In the abstract the frequency of clonal cytogenetic abnormalities in all MDS was 30 percent, the most common being trisomy 8, deletion 20q, deletion 7q, deletion 5q.

"So that indicates that these occur quite frequently in nonexposed de novo cases of MDS, while the analogous frequency in benzene-exposed cases was only 24 percent." And then he went in and specifically evaluated those changes.

Q What page were you referring to?

A That was the abstract on the first page, page 2.

Q Okay.

A All right. Then on page 6, "Systematic screening for Minus 5, minus 5q, minus 7, minus 7Q, trisomy 8, deletion 20q, 11q 2, 3 were performed on each patient," and they did FISH Analysis to characterize

other chromosomal abnormalities.

Table 3, on page 11 -- and this is where he is making case/case comparisons, clinical and cytogenetic features, and then in the results, "The prevalence of clonal cytogenetic abnormalities was lower in benzene-signal cases than matched unexposed cases with relative deficits observed for trisomy 8 as well as for deletion 7q abnormalities. Clonal cytogenetic abnormalities involving chromosome 5q alone were not found in benzene signal cases." Then it goes on.

"The findings indicate that chromosomal abnormalities in MDS cases developing secondary to high benzene exposures are not consistent with the paradigm involving unbalanced loss of chromosomes 5 and/or 7 that is characteristic of TMDS, slash, TAML, secondary to treatment with alkylating chemotherapeutic agents."

Q And where is the data for this?

A I didn't see it in the table. It may just be that description.

Q And this is, in fact, a study by a man who has testified under oath that if you don't have an abnormality of chromosome 5 or 7, the leukemia cannot have been caused by benzene, true?

MR. PERRY: Objection --

THE WITNESS: Yeah, I can't -- I don't know.

BY MR. METZGER:

Q You're familiar with that testimony by Richard Irons?

A No, but I've never made that claim.

MR. METZGER: Are you familiar with that, Stan?

MR. PERRY: No.

MR. METZGER: I'll have to read this. This is interesting.

BY MR. METZGER:

Q Okay. Have you now identified for me all of the studies that you're relying on in support of your opinion that abnormalities of chromosomes 5 and/or 7 in AML are not associated with benzene exposure?

A Well, all I said was that recent data indicates that they're not associated with benzene exposure. My opinion is that all of this collectively, all of this data collectively just indicates that you cannot use the presence of 5 and/or 7 to definitively identify causation. That's my opinion.

Q I understand that. But I'm asking you a different question.

A Okay.

Q It really is a much simpler, basic question, Have you identified for me now all of the studies in the published literature or even the unpublished literature,

if there is such a thing, that you're relying on in support of your opinion that abnormalities of chromosomes 5 and/or 7 in AML are not associated with benzene exposure?

A Okay. I think those are the only ones that would indicate that 5 or 7 are not associated with benzene exposure. But there's lots of other literature that I would use in support of my position that these things happen in de novo cases.

Q I understand. Okay. You mentioned trisomy 8. And that was the one that Dr. Irons found most prevalent; is that correct?

A I think that's the one he found most prevalent in just the MDS cases collectively, generally, in China.

Q And also for benzene-exposed cases?

A I don't know. I don't think so.

Q Okay.

A Okay. "The prevalence of clonal" -- this is from him on page 11, "The prevalence of clonal cytogenetic abnormalities was lower in benzene-signal cases than matched unexposed cases with relative deficits observed for trisomy 8 as well as deletion 7q."

Q Would you agree that on balance, all other things being equal, a complex karyotype in a person with AML who had an occupational history of exposure to

benzene-containing solvents is more consistent with causation than noncausation?

MR. PERRY: Objection. Vague. Lack of foundation. Assumes facts not in evidence.

THE WITNESS: I would say that that whole scientific area has gotten too fuzzy to answer that. I would have said yes, that a complex cytogenetic change is consistent because it is definitely consistent with alkylating chemotherapeutic agents. And that really has been sort of what most people thought benzene AMLs were going to look like. They were going to look comparable to the alkylating chemotherapeutic agents.

But David Eastman at UC Riverside has continually put out study after study demonstrating that benzene's metabolites may, in fact, be acting as topoisomerase 2 inhibitors. And that may be the underlying mechanism by which benzene is causing leukemia. And if that's true, then, no, you wouldn't expect to see complex cytogenetic changes. You would expect to see very defined balanced translocations. So I just -- I don't think that that picture is clear enough to answer right now.

BY MR. METZGER:

Q You have examined -- well, you have reviewed carefully the chromosome abnormality reports for this

case, correct?

A Yes, I've looked at them.

Q Do you have those?

A Perhaps. I'm not sure if I brought them or not.

MR. PERRY: Let's take a break and wrap up this topic before we get into the Topic No. 4.

MR. METZGER: Sure.

MR. PERRY: If this one goes on 20 or 30 more minutes, maybe take a --

MR. METZGER: We will take a break, and I will just continue. Sure.

THE WITNESS: Yeah, I do. I have one. Is that all you need?

BY MR. METZGER:

Q Will that suffice where they're all listed? Do you happen to have the micrographs?

A The karyotype?

Q Yeah.

A Yeah.

Q Do you have any of the others by chance?

A I think that's all I have.

Q Let's take a break now.

(A break was taken)

MR. METZGER: Back on the record.

BY MR. METZGER:

Q Dr. Pyatt, is Exhibit 20 a chromosome analysis report that you reviewed for this case?

(Exhibit 20 marked)

THE WITNESS: Yes.

BY MR. METZGER:

Q And is it --

A For Mr. Head?

Q -- for Mr. Head?

A Yes.

MR. METZGER: And, Stan, I will give you stuff so you can look on.

MR. PERRY: Thank you, sir.

MR. METZGER: Let's go off the record.

(Discussion off the record)

MR. METZGER: Back on the record.

BY MR. METZGER:

Q Exhibit 20 was part of your file you brought today, correct?

A Yes.

Q And is it true that what's been marked as Exhibits 21 through 26 that these are called karyotypes?

A Yeah, these are all karyotypes.

Q Okay. And they are karyotypes of Mr. Head's chromosomes; is that correct?

A Yes, and his AML.

Q And these were also part of your file?

A Yes.

Q All right. And just let's be clear for the record, Exhibit 21 is a karyotype of Cell No. 2, so designated, correct?

A Yes.

Q And Exhibit 22 is of Cell No. 3?

A Correct.

Q And Exhibit 23 is of Cell No. 4?

A Yes.

Q And Exhibit 24 is of Cell No. 7?

A Yes.

Q And Exhibit 25 is of Cell No. 8?

A Yes.

Q And Exhibit 26 is of Cell No. 11?

A Yes.

(Exhibit 21 marked)

BY MR. METZGER:

Q And all of these karyotypes were prepared by the Colorado Genetics Laboratory, correct?

A Yes.

Q And are you familiar with that laboratory? You're from Colorado.

A I know where it is. I don't know anyone that

works there, but I know where it is.

Q Okay. Now, what is a karyotype?

A Well, a karyotype is where you take all the individual chromosomes, and we take a picture of them. You do a metaphase spread. You take a picture of them, turn the picture into a digital image, and then a computer recognizes the various bands on the chromosomes and arranges them in pairs and rows like this.

And so then it will allow a cytogeneticist -- instead of just having a jumble of different chromosomes spread out in a circle, it will arrange them in these nice neat rows. So a karyotype is a picture of the chromosomes.

Q It's an actual picture done through a microscope of the chromosome where the chromosomes are put in a nice order so you can look at them logically?

A That's right.

Q And for the cells that we have here, the karyotypes of -- in Exhibits 21 through 26, is it correct that all of them show a deletion of the long arm of chromosome 5, so-called 5q minus?

A You know, I think that's what it shows, yes. I mean, I'm not a cytogeneticist, per se, so I don't really know; but I think that is fair. And that is what they described in their description of his chromosomal

abnormalities.

Q Right. And each of these karyotypes, Exhibits 21 through 26, also show a monosomy 7, that is an absence one of the pair of chromosome 7, correct?

A Yes.

Q And those two abnormalities are what is commonly found in therapy-related acquired leukemias, correct?

MR. PERRY: Objection. Vague.

THE WITNESS: No.

BY MR. METZGER:

Q No?

A No. They are commonly found in alkylating agent-induced AMLs, but not just any therapy.

Q Thank you. That's what I meant, but you were much more precise.

Are these chromosome abnormalities found in radiation-induced AMLs?

A Yes. I don't think it's quite as linked as it is with alkylating agents where you really do see it a lot. But I have seen studies where -- well, the problem with radiation is that it is frequently used in combination with other drugs, so it's hard to definitively say if it was the radiation that caused it or not.

Q Okay. Now, if you look at Exhibit 20, which is the report -- now, this is actually a report by a different laboratory, Genzyme Genetics, correct?

A Correct.

Q But at least between these two different laboratories, they are both reporting the 5q minus the deletion of the long arm of chromosome 5 and the monosomy 7, or minus 7, correct?

A Yes.

Q So that's consistent between the laboratories?

A Yes. I mean, the Genzyme group may have cultured the bone marrow and the Colorado Genetics made the karyotype that we're looking. So, I mean, these labs probably have a connection with one another; but, yes, they are reporting the same cytogenetic changes.

Q Okay. Now, in Exhibit 20, the interpretation in the second paragraph. It says, "Monosomies are deletions of chromosomes 5 and 7 are" frequent -- I'm sorry -- "are recurrent findings in myeloid disorders, including MDS and AML."

Do you agree with that?

A Yes.

Q And then it says, "They are particularly frequent in secondary disease following genotoxic exposures of an environmental or therapeutic nature and

are often found with additional chromosomal changes."

Do you agree with that?

A Yes.

Q And then in the last sentence, it speaks about them having a poor prognosis, which would be borne out by the clinical course of Mr. Head's case, correct?

A For sure, yes.

Q All right. Now, regarding the -- let me ask you this: You have made it part of your business to keep abreast of the literature regarding chromosomal abnormalities in acquired leukemias; is that true?

A I think that's fair, yes.

Q And you do that even though you're not a cytogeneticist?

A Yes.

Q What -- and you're familiar with the literature that addresses different therapeutic or nontherapeutic agents which can cause these abnormalities, correct?

A I think I am.

Q Okay. What -- from your study of the literature, what substances, be them -- be they pharmaceutical or nonpharmaceuticals or chemicals, industrial chemicals or physical substances, what things are there that have -- from your review of literature --

have been reported to actually cause the chromosome 5 and/or 7 abnormalities? And I'm asking broadly, not only in AML and MDS, but I'm talking also in vitro and --

A Peripheral.

Q -- peripheral blood.

A Uh-huh.

Q What things are you aware that have been reported to cause these abnormalities?

A One or the other.

Q Right.

A Right. Well, the in vitro studies that we talked about earlier demonstrate that benzene metabolites can do this in a test tube, and Martin Smith's group have seen an elevation in these markers in the peripheral blood of benzene-exposed workers. They were healthy workers, so they didn't have AML. To my knowledge, they didn't get AML, and their levels were quite high, 31 PPM.

Then you've got all the chemotherapeutic alkylating agents, and there's many: melphalan and busulfan and cyclophosphamide, and -- well, you get the picture. There's a lot them.

Q Uh-huh.

A Ionizing radiation maybe, cigarette smoking

maybe. Some studies seem to suggest that it might, others really don't. A recent study from the Berkeley group shows that formaldehyde can cause this. Then -- I mean, those are kind of the external things.

There are clearly genetics involved in these cytogenetic changes in that the monosomy 7 is clearly linked to Down's syndrome. It's clearly linked to children's AML. People at -- I don't know what the cut off is, but the older you are when you develop AML, the more likely it's going to be that you would have complex cytogenetics, including monosomy 7 and 5q. So there's something with the aging process that -- that seems to predispose to these changes.

That's all I can think of.

Q You mentioned what I would say are five chemicals or physical agents and then two diseases and age. Let's talk about the latter first.

Down's Syndrome. Down's syndrome is a genetic congenital abnormality in which a person is born with -- is it three chromosome 21s?

A Yes, that's my understanding.

Q It's called trisomy 21?

A Yes.

Q And people who have Down' Syndrome have an increased risk of AML, correct?

A Hugely.

MR. PERRY: What was the word you said?

THE WITNESS: Hugely.

MR. PERRY: Hugely.

THE WITNESS: Like 700-fold. I mean, it's striking.

BY MR. METZGER:

Q Yeah. Is it true that that is thought to be due to disregulation of the AML 1 gene on chromosome 21?

A I think that's a legitimate hypothesis, yes.

Q Are you aware of any other explanation for it?

A No.

Q And are you saying that there's actually studies that show that abnormalities of chromosomes 5 and 7 are significantly increased in AML in Down's syndrome?

A No. The only one that I know of is monosomy 7.

Q Monosomy 7 in Down's?

A In AML that Down's syndrome children get.

Q I see.

A There's a very high percentage of those that are positive for monosomy 7.

Q Okay. And you mentioned childhood AML.

Are you saying that that's a cause of

abnormalities of chromosomes 5 or 7 or that children who have AML sometimes have those abnormalities?

A That, the latter, that when you evaluate a large group of children that have myelodysplasia and/or AML, you will frequently see those cytogenetic changes.

Q Okay. But you're not saying that the AML is causing those changes, correct?

A Well, I don't know how to answer that. It could be. I mean, I don't know whether -- I mean, I guess the question boils down to whether these cytogenetic changes are what caused the AML.

Q Right. But you're not saying that the AML is causing those cytogenetic changes? If anything, it would be that those cytogenetic changes are causing the AML?

A Right. Well, let me just put this out there, and then we can interpret it however you want. But you will frequently see the 5q, 3, 1 as an initiating event where the monosomy 7 is frequently observed as an evolutionary event. So in that case, really, the AML did kind of cause it because it wasn't at first diagnosis and then you pick it up later as the disease progresses and evolves. So that's why I was pausing on your question.

Q So you're saying that the childhood AML may be

a causative or predisposing factor for the development of monosomy 7?

A I wouldn't limit that to just childhood. I mean, you frequently see -- I mean, not frequently, but you will sometimes see monosomy 7 as an evolutionary event.

Q I understand. Incidentally, regarding Mr. Head, is his monosomy 7, in your opinion, an evolutionary event, or is it part of a primary clone?

A It was primary.

Q Primary clone?

A Yes.

Q So in Mr. Head's case, it's your belief or opinion that the monosomy 7 and the 5q deletion were clonal events which actually were significant factors in the development of his AML; is that correct?

A I couldn't rule that out. I mean, I would say that is certainly possible. We just don't know.

Q Do you think that's probable, or is it just possible?

A I would have to say it's possible. I don't know whether it's probable or not. I mean, when you look at the alkylating chemotherapeutic literature, as an example, you will see frequently see 5 or 7, but not a hundred percent of the time. So you can get AML from

those chemicals that don't have these cytogenetic changes.

Q I understand. But when you have, as in Mr. Head's case -- let's just talk about Mr. Head -- the chromosomal abnormalities that were significant to Kavita Reddy, the cytogeneticist who evaluated his karyotypes, the chromosome abnormalities that were most significant to that researcher were the abnormality of chromosomes 5 and 7, correct?

A Particularly for prognosis, you bet. They are very important to understand prognosis.

Q But they were also significant for this cytogeneticist in that this cytogeneticist thought that they were particularly frequent in secondary disease following genotoxic exposure of an environmental or therapeutic nature, correct?

A Right, I agree with that. But I can't say definitively that they are what caused the disease anymore that Dr. Reddy could. We just don't know that. It very well could be. It could be the thing that is causing the cell to become leukemogenic, but we don't know that definitively.

Q You don't?

A I mean, Martin Smith --

Q I'm asking about you right now. You don't

know that to be the case?

A Well, yeah, but I'm getting there. In these publications that we are talking about, they're finding these cytogenetic changes in peripheral blood in people that don't have leukemia. So there's clearly something more to the story than just having a monosomy 7.

Q Clearly. I mean, if you just have it in one cell, you're probably not going to develop leukemia.

A That's all I'm saying.

Q It takes a clone to proliferate and so that you get a certain number of cells, a so-called critical mass, and at that point you got leukemia, right?

MR. PERRY: Vague.

THE WITNESS: I won't argue with that. I might quibble over some of your terminology --

BY MR. METZGER:

Q The concept is.

A -- but, yeah, I would agree with that.

Q All right. Now, let's get to the other part of this which you identified.

A Okay.

Q You mentioned five substances that you are aware that caused these abnormalities or have been reported in the literature to cause them in some animal or human or some system.

A Yes.

Q The first you mentioned was benzene metabolites, correct?

A Yes.

Q And by that, you're referring to what?

A It varies. Hydroquinone is almost always one of them. I think Martin Smith's group may have looked at benzene triol, para-benzoquinone. I don't think transmukanaldehyde has ever -- so hydroquinone, para-benzoquinone, various metabolites.

Q And those are the chemicals which are formed when benzene is metabolized primarily in the liver and also somewhat in the bone marrow, correct?

A Yes, that's correct.

Q And you mentioned alkylating agents, and I think we already discussed that, correct?

A Yes.

Q And you mentioned ionizing radiation?

A Yes.

Q And cigarette smoking?

A Yes.

Q And formaldehyde.

A Yes.

Q Okay. You've reviewed the medical records in this case, correct?

A Yes.

Q And you've also read some depositions?

A Uh-huh, yes.

Q And that's all identified on the list of materials that you've received?

A Yes.

Q You reviewed everything that you received?

A Pretty much.

Q Was Mr. Head, to your knowledge, ever exposed to any alkylating agents prior to the development of his AML?

A Not that I saw, no.

Q Was he ever exposed to ionizing radiation prior to the development of his AML?

A Probably not to the extent that it matters. But, I mean, we're all exposed to ionizing radiation. And he lived close to Rocky Flats, so maybe he had a little bit more than other people. But, I mean, the bottom line is I don't think that's what caused his disease.

Q Okay. And let's just talk about that a little more, then.

Do you have any data or evidence that Mr. Head received a greater dose of ionizing radiation from living so many miles from Rocky Flats than anyone else

in the general population?

A No. And I hope he didn't because I actually live closer to Rocky Flats than he did.

Q And so far, you haven't developed AML?

A So far.

Q How close to Rocky Flats do you live?

A Probably three and a half miles. Rocky Flats is squeaky clean right now.

Q All right. It's been squeaky clean since about, what, 1989?

A I'd say that's right, yeah.

Q So we're going to mark Dr. Pyatt as Exhibit 27 since he's alive and lives next to Rocky Flats. No, I'll withdraw that exhibit.

All right. And you mentioned cigarette smoking. And from your review of the records in this case would you agree that Mr. Head did not smoke?

A Yes.

Q Was there any evidence, that you're aware of, of exposure to -- was there any evidence, that you're aware of, of residential exposure to secondhand smoke for him?

A I don't think that's true.

Q So is it accurate that to a reasonable degree of scientific probability you have ruled out cigarette

smoking as a cause of his chromosome 5 and 7 abnormalities and as a cause of his AML?

A Yes.

Q Do you have any information that he was ever exposed occupationally or otherwise to formaldehyde?

A For sure he was.

Q How was he exposed to formaldehyde?

A We all are exposed to formaldehyde.

Q From the air?

A And from endogenous production. We make a lot of formaldehyde endogenously. So he was absolutely exposed to formaldehyde.

Q Just like everybody else in the general population?

A Yes, he was.

Q And to a reasonable degree of scientific probability, have you ruled out Mr. Head's endogenous exposure to formaldehyde and any other exposure to formaldehyde that he may have had as a cause of his chromosome 5 and 7 abnormalities and his AML?

A I don't think I can. I don't believe -- well, there's two pieces to that story. One is that the Berkeley group, Dr. Zheng, recently published a study where she saw in formaldehyde-exposed workers an increase in monosomy 7. That's the only time that it's

ever been reported. It absolutely needs to be repeated, but there it is.

I mean, formaldehyde, according to the Berkeley group, can cause this lesion. The U.S. EPA in their latest formaldehyde risk assessment took it all the way down to 20 parts per billion formaldehyde, which is essentially what we're all exposed to all the time, and their extrapolation said that 20 percent of all leukemias in the United States are caused by that background level of formaldehyde.

So if you accept what the U.S. EPA just did, I don't think there's any way to rule out the role that formaldehyde played in anyone's disease.

Q Well, do you accept that or not?

A I don't. I think that's a gross exaggeration of the science, but I accept what the Berkeley group published.

Q Well, I'm not asking you about what the EPA opines or what the Berkeley group opines, Dr. Zheng or Dr. Smith, I'm just asking about you, Dr. Pyatt.

In your opinion, the opinion of David Pyatt, to a reasonable degree of scientific probability, have you ruled out Mr. Head's exposure to formaldehyde as a cause of his chromosome 5 and 7 abnormalities?

A I don't believe that background levels of

formaldehyde can do it; so, yes, I have ruled that out.

Q And have you, likewise, ruled out his exposure to formaldehyde as a cause of his AML?

A Same. Yes, I have.

Q Okay. Now, I think we can go on to your opinion No. 4, which Stan has been waiting eagerly for.

MR. PERRY: I just want to hear you all say etiologic window.

THE WITNESS: Oh, okay.

MR. METZGER: He wrote it right there, etiologic window.

BY MR. METZGER:

Q And what you actually wrote here is that the etiologic window for chemically induced AML is 10 to 15 --

A -- windows.

Q Light years, correct?

A Correct. Can we change that?

Q You want to change that on the original exhibit?

A Yeah.

Q I think its clear to the record. When it comes back, you can change it on it.

A That's fine.

Q And that is your opinion?

A Yes.

Q Isn't it true that Mr. Head falls right within that period?

A No. Well, I mean that the benzene exposures that both Steven Petty and Doug Daugherty evaluated were in the '80s and extended just a little into 1991. So, I guess, that year would pick up the 15-year window. I mean, if you just drew a line in the sand and said it doesn't matter anything over that or under that; but most of his exposures would be outside of that window.

Q Let's define terms, then. I thought, from your prior testimony in other cases, that the way you were defining etiologic window was from the date of last exposure to the date of diagnoses; is that correct?

A Except go the other way, from the date of diagnoses and move back.

Q To the date of last exposure?

A To this 10- or 15-year window. So if he was diagnosed with AML in 2006, then that would carry back to 1991 for 15 years.

Q So as you define etiologic window, Mr. Head's etiologic window is right within the range that you say here, 10 to 15 years, correct?

MR. PERRY: Objection. Assumes facts not in evidence.

THE WITNESS: No, because the exposures that were quantitated for him in the '80s would be outside that window. So what that means if you evaluate the literature is that the only exposures that you would count toward calculating what his risk is are the ones that happened within 10 years, maybe 15.

BY MR. METZGER:

Q I'm getting confused. I thought that there's really two ways of looking at latency. One is from initial exposure to diagnosis and the other is from last exposure to diagnosis.

Do you agree with that?

A Well, I agree that that is the way latency has been defined. I mean, that's the problem with the term "latency." And that's why Richardson and some of these other folks have used this etiologic window.

Q You mean studies by Richardson and --

A -- Finklestein.

Q Right. What they have looked at, actually, is the date from last exposure to diagnosis, or you could say from diagnosis back to last exposure. And those studies are concerning that period, not the duration of exposure or the inception of exposure, correct?

A It's not concerning the inception of the exposure.

Q Or the duration of it, correct?

A Well, I think the duration plays a role in the cumulative exposure that a person would receive.

Q I understand. But we're not talking about cumulative exposure now. We're talking about this concept of etiologic window?

A Right.

Q Isn't it true that that concept, as you have defined in prior cases, is the period whichever way you measure it, from front to back or back to front, from last exposure until diagnosis?

A If you go backwards, yes.

Q Right. And if you go backwards from the date of diagnosis of Mr. Head's AML in 2006 to the date of his last exposure at Pemeco, that's 15 years, right?

A Right.

Q And that falls within the etiologic window of 10 to 15 years, doesn't it?

A Only that one-year's exposure. The exposure that occurred in the '80s do not.

Q I understand. But that's not what etiologic window is about, right?

A I disagree. I think that's exactly what it's about.

Q I thought if you talk about the early

exposures, then you're talking about traditional latency, so to speak?

A The etiologic window, that I have always defined it are the exposures that occur within 10 or 15 years of diagnosis, and those are the only ones that matter.

Q Well, let's take a look at that, then. And do you have certain studies that you are relying on for that opinion?

A Uh-huh, yes.

Q And you probably have those here?

A I do.

Q Let's have those.

A Finklestein. Do you want me to read them into the record?

Q No, let me have them, and I'll --

A Richardson. Otto's paper. Trebic, Hayes, Richardson, Deborah Glass. And there's another one Sealberg, but I forgot it.

Q So you have -- I'm just going to identify them into the record by author and year.

So you have Finklestein, 2000, correct?

A Yes.

Q And then you have Richardson, 2008, which is actually concerning cigarette smoking?

A That's true. Yeah, you can pull that out, if you want. But it just shows that it's consistent with the same idea.

Q Okay. You have Table 9 from the new Wong study, which we have already marked as an exhibit, correct?

A Yes.

Q You have Trebic, which is actually Trebic, 2000. It's a review.

A 2010.

Q I'm sorry, 2010?

A Yes.

Q It's a review?

A Yeah, he just summarized the literature.

Q You have Hayes, 1997?

A Yes.

Q And Richardson -- this is the one regarding benzene -- 2008, correct?

A Yes.

Q And then you have the letter to the editor by Glass from 2004?

A Right.

Q And you also mentioned this -- is it a letter or an article by Silver?

A It's an article. It's from 2002.

Q Okay.

A By Silver, is the first author.

Q Regarding Finklestein, in the abstract he writes, "It would appear that risk is attributable primarily to exposures incurred during the previous 10 to 20 years with exposures in their most recent 10 years being the most potent," correct?

A Yes. And that is consistent with what Dr. Richardson calculated for the Pliofilm workers as well 10 to 20.

Q Okay. Mr. Head's last exposure was certainly less than 20 years before his diagnosis, correct?

A Yes. So based on that analysis, all of them would count.

Q Okay. And the next one that you have is Wong. So let's look at Wong and see -- you have here, Table 9.

A Can I have the whole -- where is it?

Q It's actually being copied.

A No, this is a different table.

Q That's okay.

A Let me look at it, and I'll pull out what I'm talking about.

Q Yeah. Why don't you tell me what you're talking about.

A Okay. This bottom row down here where --

"first exposure in decades," and then whether it had happened from 1980 to 1999, and then from 2000 and forward, just almost across the board, the exposures that occurred ten years prior to this study, when they were being diagnosed with AML, are by far the highest risks. So it definitely indicates that the most recent exposures are the ones that are -- play the biggest role in the induction of AML risk.

Q Nowhere in this table is there actually data providing the time period from diagnosis back to last exposure, correct?

A I don't know if that's -- yeah, I don't think that he's provided that.

Q What we have for here is data regarding first exposure, correct?

A Right. But if the first exposures occurred after 2000, whenever he picked up that case would be 2004 or 2005, then all the exposures occurred within that -- you know, in a very short window. And those are the ones that are driving the risk.

Q Well, let's look at this. Certainly here, the highest risk reported here of 4.18 is for those who had first exposure 2000 or later, correct?

A Yes.

Q But the risk was also increased 1.57 for those

whose first exposure was from 1980 and 1999, correct?

A I would have to look. It's not black or white, for sure. It is the highest across the board. And there are a couple that even the '80 to '99 are statistically significant, but most are not. And the more distant exposures, none of them are.

Q Which -- I was looking at the AML total. So for 1980 to 1990, there was 1.57 odds ratio, 95 percent confidence in for 1.00 to 2.45, borderline statistical significance, correct?

A Sure.

Q Which category would you place Mr. Head's leukemia in this table?

A The MD, AML, dash, MD.

Q Okay. So for that category, and that's -- okay. That's AML-MD. That's AML with multilineage dysplasia, correct?

A Yes, correct.

Q Incidentally, in your opinion did Mr. Head have multilineage dysplasia?

A I'd have to go back and look. I don't remember.

Q But that's the category you placed in him?

A Yes.

Q And why are you placing him in that category?

A Because of the cytogenetics, I think that's the appropriate place for him to go; but I'm not a hematologist, and the hematologist may have a totally different interpretation. But that's where I would put him, as an amateur.

Q As an expert, though?

A Yes, an expert.

Q I'm not going to say as an amateur expert.

A As an expert, in this case I would put him there.

Q All right. So let's look at that category. From 2000 to the current, there were no cases in this study, correct?

A I'd have to look. Right.

Q And the highest risk was for those who were first exposed between 1980 and 1999, and that was a greater than three-fold risk, which was statistically significant, correct?

A Yes.

Q So that's where Mr. Head would fall, correct?

A Yes.

Q So this study, actually, is more supportive than not supportive of any etiologic window for Mr. Head, correct?

A Well, I mean, if you cut the pie that thinly,

then that one category; but if you look at the whole picture for the AMLs, I think it's pretty clear that the exposures that occurred in 2000 were the most important.

Q Are you suggesting that splitting is not an appropriate thing to do?

A No, I wouldn't suggest that.

Q All right. So the next study is a review. That's Trebic, correct?

A Yes.

Q And there's really nothing in there other than his review of these other studies, right?

A Yes, and his conclusion which is consistent with what we're talking about.

Q Let's look at the original studies and maybe go back to Trebic, if we have time.

So Hayes 97, what are you relying on in there?

A For Hayes, the cut-off is ten years. So Hayes is ten, Pliofilm maybe ten to 20. Glass uses 15, so I think 15 is a fair cut-off.

Q Show me the data. I want to see what you are relying on.

A Okay. It's kind of confusing, but it's Table 3. And you look at Table 3 and you can see that there were no AML cases even with very high exposures that occurred farther than ten years distant, and they all

were in the recent exposures that he defines as within ten years. And then there is somewhat of a dose-response relationship with those. But in the distant exposures, those being greater than ten years, there's not any cases of AML.

Q And then the Richardson study, if we look at the abstract of Richardson, in the "Results" he says, "The association between leukemia mortality and benzene exposures was of greatest magnitude in the ten years immediately after exposure" -- and then it provides the relative risk -- semicolon, "and the association was a smaller magnitude in the period ten to less than 20 years after exposure," correct?

A That's what he said, yes.

Q It was still slightly increased?

A Very slightly, but yes. It's consistent with what Finklestein said about it. He essentially made the same observations. I mean, they were using the same data.

Q All right. And then the Glass Letter to the Editor says, "We found that leukemia was most strongly associated with benzene exposures in the period 15 years prior to diagnosis, and exposures more than 15 years before diagnosis made little contribution to the risk."

That's what we're referring to?

A Yes.

Q And you mentioned a Silver study. Is that from 2002 or 2004?

A Two.

Q And are you familiar with the Silver's paper from 2004?

A I've read it. I don't remember what he said.

Q Okay. Let me read to you from it and tell me -- I'm going to ask you if you agree or disagree with the study there.

A Okay.

Q Quote, "Given the uncertainties and exposure assessment and dose response as well as the finding of substantial risk for dose more than 15 years before diagnosis among highly-exposed workers, a more measured conclusion might be that while exposures more than 15 years prior to diagnosis appear to convey less risk than more proximate exposures, the former should not be disregarded."

Do you agree with that?

A I think based on the data set that he was reporting on, yes, because he was talking about the Pliofilm. If you look collectively at the overall body of literature, I don't think that that conclusion really holds.

Q Are you familiar with the Mary Paxton's study from 1994?

A Yes.

Q It's a reanalysis of the Pliofilm cohort?

A Yeah, I think she did a quantitative exposure assessment.

Q Is it true that in her study, the average latency from last exposure to death was 16.31 years with a range of zero to 40 years?

A I would have to look. But that is consistent with everything we're talking about. It's important to keep in mind that the Pliofilm analysis -- Richardson, Finklestein, Silver, Paxton -- those were total leukemias. And there was a CML and there were CLLs, so that could muddy the water in terms of understanding when the exposures were important for the risk, which was different than, say, Richard Hayes' study from the NCI where it was pretty clearly within ten years.

Q Okay. Well, I'll tell you what, let me get a copy of Paxton, and we'll talk about that and wrap up this discussion; but I think we should do that.

MR. METZGER: So let's just go off the record a moment.

(A break was taken)

///

BY MR. METZGER:

Q Dr. Pyatt, up until about ten years ago, most of the studies that addressed latency for benzene-induced leukemia looked at latency from date of initial exposure to either date of diagnosis or date of death in the case of mortality studies, true?

A I think that's right, yes.

Q It's only in more recent times that researchers have begun looking at data of last exposure to date of diagnosis or death in the case of a mortality study, correct?

A Yes. I mean, even some of the older studies tried to get at that by doing these lagging sorts of analysis. But it has become more sophisticated -- the analysis has become more sophisticated, say, in the last ten years.

Q And if we look at the mortality studies, the published mortality studies, many of them actually don't report the data from date of last exposure, correct?

A I think that's probably true for some of them. I don't know. I'd have to look.

Q And even for the cohort studies -- well, even for the epidemiologic studies, which are not mortality studies, I guess you call them morbidity studies, correct?

A You could have an incidence.

Q Or an incidence study.

A Uh-huh.

Q There are very few, if any, published studies -- published studies regarding benzene and leukemia which report the data from date of last exposure?

A Prior to 1997?

Q Right.

A I think that's probably right.

Q And when you're dealing with -- especially mortality studies, you don't actually have -- you're dealing with -- your primary source of record is a death certificate, which doesn't provide that type of information, correct?

A Some of them are death-certificate based. They could also be hospital based where they knew more about it. But, no, a death certificate is certainly not going to have when their last exposure was.

Q So I guess my question to you is: Other than the studies that you've identified here, what other studies are you aware of that have actually published data so that one could derive a period for last exposure to either date of diagnosis or death for benzene AML or benzene leukemia, more generally?

A There was a small study, Guenel, I think, and they did some kind of analysis.

(Reporter clarification)

BY MR. METZGER:

Q G-E-U-N --

A -- E-L or something. And they did analysis. And then it seems like there is one other one. The problem with those is that there's really not even a clearly elevated risk of AML, so you don't -- the latency argument, biologically speaking, in my view, should be how long it takes the disease to manifest itself after a person has received a sufficient dose to give them the disease, but you just can't ever get there. There's just no way to know when that happens. So all these other things that we're talking about are surrogates for really that kind of biology.

Q And from your concept, that assumes that there's a threshold dose below which leukemia cannot occur, correct?

A Yes.

Q And that's never actually been proven by anybody, right?

MR. PERRY: Objection to form. Vague.

THE WITNESS: Well, then, if you're going to make the assumption that someone's AML is caused by their

benzene in the Chinese workforce, then you've got to start when they were born and add up every single bit of benzene that they've been exposed to as a child, and no one does that.

Q In any event, let's turn to Paxton now. And I'll provide you with what -- this is Exhibit 27.

(Exhibit 27 marked)

THE WITNESS: Okay. Thank you.

BY MR. METZGER:

Q And is this the Paxton study that you are referring to?

A This was the one you are referring to, yes.

Q That I was referring to that you were aware of?

A Yes, there's two of them. This is one, and then there's another part.

Q Anyway, if we look at Table 4 on page 150 of this, that's the table that we would look to for this issue, correct?

A You know, I don't know how Dr. Finklestein and Dr. Richardson made the analysis that they made of the Pliofilm data.

Q But I'm not talking about that now. I'm talking about Paxton.

A No, but this is the -- they analyzed this data

set, and I don't know what data they were using to do their analysis. It could be this.

Q Okay. All right. But in any event, what struck me here is that Table 4 reports the data for each of the cases in both the old quota and those other in the update. And they also report -- they report the first benzene exposure and the last benzene exposure and the year of death because this is a mortality study, correct?

A That's what it appears to be, yes.

Q And that's unusual. You don't usually have a table where you find first exposure, last exposure, and date of diagnosis or death, correct?

A Yeah. I don't know when Dr. Paxton did this; but, yeah, I haven't seen this that often.

Q Okay. And I think you mentioned that you have to look at -- you wouldn't look at all of the data because some of these were not AMLs, right?

A Yes.

Q So what I would like you to do is to tell me which of the cases by number you consider to be ones that should be looked at in assessing the etiologic window for AML or ANLL, whatever.

A One, three, four, five, six, seven, eight, nine, 17, 19, 20, 21. Just off the cuff, those would be

the ones.

Q Okay. So would it be accurate that for those to determine the duration, the length of the etiologic window, as you've defined it, for this data set, what one would do is one would take the -- you would subtract for each of those cases the last benzene exposure from the year of death and then add up all of those and divide by the number of cases?

A I don't know how to do it. I mean, I didn't do it. I'll try to follow your question though.

Q What I'm getting at is this: If we're looking at the etiologic window, we're looking at the period between last benzene exposure, and in this case, year of death because this is a mortality study, correct?

A Is that what you're looking at or what Richardson and Finklestein looked at?

Q I'm not talking about Richardson and Finklestein.

If we want to use this data to look at the etiologic window, which you've defined, looking back from the date of death to date of last exposure, what we would do here is we would look at the two columns, year of death and last benzene exposure, correct?

A I don't know how to do that. I mean, I wouldn't do that.

Q Why not?

A Because I'm not an epidemiologist. This has been done by Mr. Richardson and Finklestein. I don't need to do it. They have evaluated this exact data set.

Q I understand. But I guess what I'd like -- if you wanted to find out what the average etiologic window was, as you've defined it, from this data set, what you would do is take those cases that you identified and you would determine the number of years between last benzene exposure and year of death, correct?

A I don't know how to do it. I wouldn't do that because I don't know how that analysis was done. I'm not an epidemiologist. I wouldn't be able to make that analysis of this data.

Q Let's just look at the first case.

Last benzene exposure was 1942 and year of death was 1958. That's a 16-year period, correct?

A From the last benzene exposure.

Q Correct?

A Yes.

Q So that's 16. And you said the next case is No. 3, and that's a -- last benzene exposure, 1958; year of death, 1958. That's a zero, correct?

A Yeah, based your math, yes.

Q Tell me if you disagree with the math, but I

just want to go through this exercise to see.

A No, so far your math is right.

Q And Case No. 4 is 1958 to 1960. That's just two years, correct?

A Yes.

Q And then Case No. 5 is 1960 to 1961. That's one year, correct?

A Yes.

Q Case No. 6 is 1961 to 1961. That's zero years, correct?

A Yes.

Q And Case No. 7 is 1948 to 1957, which is nine years, correct?

A Yes.

Q Case No. 9 is 1960 to 1979, correct?

A Yes.

Q And that's 19 years, correct?

A Yes.

Q And Case No. 17 is 1958 to 1985, which is 27 years, correct?

A Yes.

Q Case No. 19 is 1946 to 1986. That's a period of 40 years, correct?

A Yes.

Q Case No. 20 is 1949 to 1987, which is 38

years, correct?

A Yes.

Q And case No. 21 is 1945 to 1974, which is 29 years, correct?

A Yes.

Q So if we added up those numbers and we divided by 11, that would give us the average period from last benzene exposure to year of death for this data set, correct?

A Defined that simply, perhaps; but that is not what Dr. Finklestein did.

Q Well, I'm not talking about what Dr. Finklestein did.

A Well, this is a published paper that's directly relevant to this question. I'm not going to agree on the record that what you're doing has any relevance at all.

Q Okay.

A None.

Q Okay. I'm not asking you to judge relevance. That's for the judge.

I actually didn't do it this way with your cases that you identified.

A I have a calculator.

Q Would you -- would you mind?

Here's the numbers. If you would kindly add 16, plus zero, plus two, 1, plus zero, plus nine, plus 19, plus 27, plus 29, plus 40, plus 38, what do you get?

A 182.

Q Would you agree with me that there's 11 cases?

A Yeah.

Q So if we divide 182 by 11, what do you get?

A 16.5.

Q So that would be 16.5 years from last exposure to date of death as the average period for this data set, correct?

A Yes, based on what you are doing, yeah.

Q Okay. All right. I think that covers that. I'm not sure.

Under your Opinion No. 4, you have written, "Topo II and AA," which is alkylating agent?

A Yes.

Q "Smoking, radiation and benzene," correct?

A Yes.

Q And topo II inhibition -- or inhibitors, I think you've indicated induce a different type of a chromosomal abnormality than the 5 and the 7, correct?

A Yes.

Q Those typically induce abnormalities of the MLL geno-chromosome 11 and also the 15, 17 translocation

of AML, M3, right?

A The inversion 16.

Q That one, too, right, which are different from what we're talking about here, the 5 and 7?

A The topo II inhibitors don't typically cause chromosome change in 5 or 7.

Q And the latency for topo inhibitor-induced AML is generally shorter than that for alkylating agent-induced AML, correct?

A Yes.

Q All right. Now, regarding alkylating agent-induced AML, are there any studies that have evaluated the date of last exposure to alkylating agent therapy and date of diagnosis or date of death from AML?

A Yeah, 50, 60. Huge number of studies. I've done that.

Q From date of last exposure of alkylating agent therapy as opposed to first exposure?

A Well, yeah. But the alkylating therapy is usually a matter of months. This is not drawn out over years, so it's a very easy calculation to make. They would be essentially the same thing.

Q Well, aren't there patients who have AML who get alkylating agent therapy, they go into remission and then a year or two, three or even five years later, they

relapse and then are given more alkylating agent therapy?

A They wouldn't be included in these studies. But you would have to look at the actual studies to make sure.

What I do know is that there have been several review papers, and everyone is pretty clear that the alkylating agent-induced leukemias happen within five to ten years of treatment.

Q Have you brought those studies with you?

A No.

Q Are they on the CD?

A Probably not.

Q Okay. I guess I can't ask you about them. Well, can you identify those studies for me that you're talking about?

A Leone has a review paper. Pedersen-Bjergaard has done several. Richard Larson has done two or three. P-E-D-E-R-S-E-N, hyphen B-J-E-R --

Q -- G-A-A-R-D.

A Close enough. Larson. Leone, L-E-O-N-E. I think they publish the most. Janet Rally. Yeah, I didn't put them on the disc because I didn't think this would be something we would debate. But there are lots out there.

Q Okay. Let me ask you, and maybe we don't need to debate it. I gather that you're really not relying on the body of literature concerning alkylating agent-induced AML with respect to your opinion regarding the etiologic window for benzene-induced AML; is that correct?

A Well, yes and no. I mean, the alkylating agent AML, as well as all these -- smoking, radiation, and topo II -- paint a very consistent picture that benzene fits right into. So there's no anomalies in our understanding of how things cause leukemia in people, how much time that it takes; and from that standpoint, I think it's very important.

If you're going to take the position that these 5 or 7 chromosomal abnormalities have some relevance to Mr. Head's etiology, then the alkylating agent chemotherapy is the most direct connection to that; and there, again, the latency period for these cases would be very important, and they happen within five to ten years.

Q Now, you would agree with me that benzene -- well, alkylating agents have a strong alkylating effect, correct?

A That's how they work.

Q Right. And benzene is, at best, a weak

alkylator, correct?

A Yes.

Q And for chemicals that are weak alkylators, would it take a longer period of time for them to induce the abnormalities characteristic of alkylating agent-induced AML?

MR. PERRY: Objection. Vague.

THE WITNESS: There's no data to support that.

BY MR. METZGER:

Q Is there any data that would refute that concept?

A You might go and rank the different forms of alkylating chemotherapeutic agents and see whether there's a difference between each agent and how long it takes. I don't think that that's ever been done, but you might be the able to address that question.

Q You haven't analyzed that, though?

A No, I have not analyzed that, no.

Q All right. Now, I think we're done with No. 4.

The 5th opinion, "The epidemiologic evidence does not support printers and/or painters having an increased risk of leukemia."

And that's your opinion based upon the epidemiology studies that you have reviewed which are on

the CD?

A Yes.

Q I don't think we need to discuss that.

A And IARC, their interpretation; but, yes. That's on there.

Q Let me ask you, then, Is there a folder on this CD? You told me there were folders. Is there a folder of the studies that you are relying on regarding printers and AML and painters or -- strike that.

Is there a folder that has the data that you are relying on or the studies that you are relying on for Opinion No. 5 on the CD?

A Yes.

Q And there's a separate folder for printers and a separate folder for painters?

A No, they're the same.

Q All in one folder?

A Yes. And some of those are also going to be in the folder up here, number one, because they are solvent kinds of studies; but they're all on there.

Q They're all there? Every study that you're relying on in support of your Opinion No. 5 is on the CD?

A I think that's fair, yes. It's not every study in the world.

Q The ones that you're relying on?

A Yes.

Q Okay. I think we're done with that.

Number 6, would you tell me that opinion is?

A "Cumulative exposure is still the best predicter of AML risk. Simply stating a peak with no duration is meaningless and impossible to compare with the quantitative epidemiological data or to conduct a risk assessment."

Q Have you conducted a risk assessment for this case?

A No. I wouldn't. I don't think it's appropriate to do for a single individual; but you couldn't do it with the data that Mr. Petty provided even if you wanted to.

Q And what are the studies that you're relying on for Opinion No. 6?

A Pliofilm, Rob Schnatter's nested case control. Rushton's nested case control.

Q That's the 1997 paper?

A Uh-huh. Jim Collins work out of Dow.

Q Now, when you said "uh-huh," was that yes?

A Yes. Lesley Rushton from 1997, yes, her nested-case control study. Jim Collins and Brenda Ireland when they looked at the Dow -- I mean,

these are the studies that evaluated kind of this debate as to whether or not cumulative exposure is really the best metric for understanding leukemia risk.

I'm drawing a blank. What did I say? Pliofilm.

I don't need to guess. I have a list. I brought some of them -- you're done with etiologic window?

Q I think so.

A Otto Wong. Yeah, that's a good one. I forgot about that. CMA, his CMA study.

Q Let me just identify by author and year and maybe a brief description.

A Otto Wong from 1987. Number one, the general results from his CMA study.

Q Good.

A Richard Hayes, 1997.

Here's Jim Collins from the Dow.

Q What year is that?

A 2003.

And I might have Brenda Ireland's in here, too. This is the Pliofilm study, Rinksy, from 1987; Lesley Rushton's nested-case control study from 1997; then Costantini, "Exposure to Benzene and Risk of Leukemia Among Shoe Workers," from 2003. This is

Rob Schnatter's from 1996, "Lymphohematopoietic Malignancies in Quantitative Estimates of Exposures to Benzene" fits his nested-case control study. Then this is -- Stephen Rappaport's published several.

But here's a paper he published in 2005 where he did a modeling exercise, kind of made some comparisons between cumulative exposure and the blood levels associated with cumulative exposure and whether or not that would change with little peaks and intermittent exposures to benzene. And he's got several.

And then I have several animal studies, one from Carol Snyder, 1988; Kronkite, 1989; Gill, 1980, Coffin, C-O-F-F-IN from 1990 -- sorry, 1977; Toft, T-O-F-T, from 1982; and Dempster, D-E-M-P-S-T-E-R, from 1984. That's also Carol's Snyder's lab.

Q Let's first talk about the human data. Then we will get to the animal data.

A Okay.

Q Here's my first question, Which of these studies that you identified, if any, actually analyzed for both cumulative dose and some metric, such as peak exposure, average intensity, or mean intensity, or some other metric, and compared the two different metrics?

A My interpretation of Pliofilm, he did that.

He looked at the various metrics and put them into his model, and the cumulative fit his model better.

Q You're speaking Rinsky?

A Yes. We examined several -- this is from Bob Rinsky's paper: "We examined several models to identify the one that would adequately explain the risk of death from leukemia with the minimal number of terms. In our first examination, we considered three exposure variables separately, cumulative exposure, duration of exposure, and average exposure rate, and we figured three separate models for each of these variables. In these three models, cumulative exposure peak PM years was found to be the strongest single predicter of death from leukemia."

Q What did you understand them to mean by "average exposure rate"?

A What the concentration term is out of cumulative exposure. So you've got duration and you've got what, an eight-hour time-weighted average would be; and then you multiply those together, and that's how you get your cumulative exposure.

Q So average exposure rate was not a peak exposure, correct?

A It depends on your definition of "peak." But it is a concentration term. He probably has defined it

in here; but however it's defined, for him, cumulative exposure was the best predicter.

Q I understand. Can you find how he defined it? I want to see if we're talking apples and apples or apples and oranges.

A I'm not going to be able to read this.

Yes, the rate of exposure is cumulative exposure divided by the duration of exposure. So, yeah, it's just what I said. It's, essentially, what Deborah Glass did in her analysis.

Q So it's not a average or mean intensity metric, is it?

A That's exactly what it is. It's an average intensity of the exposure during that eight-hour time-weighted average.

Q Okay. What was the value for that? Do you have that from the paper?

A The value?

Q Yeah, the value --

A No.

Q -- for the rate?

A I don't think he published that, because he said that the cumulative was the best metric. So I think that's all -- oh, no, he didn't. He did not do that, but Rob Schnatter has done that, published it in

1996.

Q For this cohort?

A Exactly. For this cohort, the Pliofilm cohort, and he looked what the air concentrations had to have been in the cohort before you started to see a significant increase in leukemia, and it was something around 20 to 25 PPM on an eight-hour time-weighted average.

Q Were there any workers in the Pliofilm cohort who were not exposed at those high concentrations?

A Sure. Tons.

Q And was there actually exposure monitoring data from them, or was it all just reconstructed?

A In the dryside workers, I would have to go back and look. I just don't remember those kind of details.

Q And this is the cohort that you have previously referred to as having exposure to pure benzene, correct?

A Yes.

Q All right.

A Benzene as a solvent.

Q Okay. My question to you was if you would identify those studies which actually -- that you were relying on here that actually did a comparison between

cumulative dose and some short-term --

A Something else.

Q -- something else, right.

Were there any other studies, other than Rinsky, that did that?

A I think that's probably the most important. But Otto Wong -- I think he did the same thing in his CMA analysis. Yes, he had an intermittent-exposure group. And what he said about it was "The group of 1,066 individuals with only intermittent exposure to benzene contributed a total of 19,512 person years. Overall mortality was slightly but not significantly less than expected. The number of deaths from cancer was almost identical to that expected."

So nothing in the intermittent group.

Q Did he actually provide what the concentration was for that intermittent group?

A Perhaps. Probably not in this paper. That probably would be in No. 2, Volume II.

Q I can look and see. That's fair enough.

A He clearly was interested in the various exposure metrics, and the intermittent one didn't predict the risk.

Q And was this -- the workers in this study, were they -- the Wong study, was that pure benzene or

solvents?

A Chemical workers, I think it was solvents; but I may not -- I don't know.

Q Okay.

A I don't know. That, probably I can find out, if you want me to dig through here.

Q No, I can read it myself. That's okay.

A "Chemical Workers Occupationally Exposed to Benzene." That's what the title is.

Q Okay. Are there any other human studies that you are relying on where there is a comparison made between the metrics?

A In the Hayes' '97 paper, they have average PPM, constant PPM, duration, and cumulative exposure. The problem with this one and really all of these is that it's very difficult for the investigators to separate cumulative exposure from high intensity. So it's very difficult to get at what contribution the peaks may have made. Here, there really doesn't appear to be any difference, really, between the average PPMs or the constant PPMs and the overall risks.

And the Deborah Glass' study, I think, supports that cumulative exposure is driving the risk. Jim Collins' work is probably one that would be on the other side. And he says, "That while the observed"

numbers -- "number of deaths is small in this study, the number of peak exposures greater than a hundred PPM to benzene is a better predicter of risk than cumulative exposure."

But his peaks were still defined as to the duration, and they were at least 15 minutes. So they were a hundred -- greater than a hundred PPM for at least 15 minutes. It wasn't just a number.

Q Okay.

A There's some others.

Q Okay.

A What Rob Schnatter said in his abstract was, "Duration of exposure to benzene was more closely associated with the risk of leukemia than other exposure variables."

Q So we found duration as opposed to cumulative dose?

A Right, right. But that the longer someone is exposed, that that has an influence over. And then he does have years at greater than .5 PPM and years at greater than 1.0 PPM with AML risks. So there's some intensity data in there as well.

I don't remember exactly what Lesley Rushton did, but I think she did the same kind of thing.

Q Well, I have the paper and I can read it. I

understand where you're coming from this on this.

A Okay.

Q Okay. Is it still your opinion that benzene is a known cause of human AML?

A Caveated with the exposure scenarios that we have been discussing all day, yes.

Q And I'm curious to find out is it your opinion today that benzene is a known cause of the seven or eight AML subtypes under the French, American, and British classification system?

MR. PERRY: Objection. Compound. Vague. Not relevant.

THE WITNESS: Yeah. The relevant part I agree with, but I understood your question.

The only one that I think you could have made an argument for separating it out was the APL. And there, there have been separate epidemiological studies, and it was a distinct-enough subtype to where people have thought about it differently. I don't know that that has changed, but Otto Wong's finding is -- would push the argument toward that benzene can, in fact, do that.

BY MR. METZGER:

Q Is that where your current leaning is today?

A I'm not sure. I haven't actually had to form

that definitive opinion.

Q I'm sure there will be a case.

A Perhaps.

Q We'll defer until then.

You are familiar with the known causes of AML?

A I consider myself to be, yes.

Q You've actually published on that, haven't you?

A The known causes of AML?

Q Yeah.

A Sure.

Q So I want to explore with you some of those and see how they relate to this case.

We touched upon ionizing radiation. But ionizing radiation can come in different forms, correct?

A You mean different kinds of radiation or comes from different sources?

Q Both.

A All of that is true, yes.

Q Some ionizing radiation exposure to humans occurs from medical exposure, therapy or diagnostic?

A Procedures, yes.

Q And to a reasonable degree of scientific probability, have you ruled those out as being a cause of Mr. Head's AML?

A Mr. Head's AML?

Q Yes.

A Yes, I haven't seen any evidence to support that that's what caused it.

Q And there's also environmental radiation exposure, naturally occurring radiation material called NORM and cosmic radiation, correct?

A Yes, and others.

Q Right. And to a reasonable degree of scientific probability, have you ruled those out as a cause of his AML?

A Yes. I mean, I haven't seen evidence to make me think that that's what it was.

Q And then there's also some domestic exposures, ionizing radiation, gamma radiation, and radon, correct?

A Yes, that's what I was thinking about earlier, yes.

Q To a reasonable degree of scientific probability, have you ruled those out as a cause of his AML?

A I hadn't really thought about it. I don't know how I could do that because I don't know what his radon levels were in this home.

Q Well, let me ask it this way: Are you aware of any evidence that Mr. Head had domestic exposure to

ionizing radiation?

A That's much clearer, and the answer is no, I'm not aware of any evidence.

Q In the absence of such evidence, you are unable to state that domestic radiation exposure caused his AML, correct?

A Yes, I can say that. So, yes, you are correct; no, I could not say that.

Q To your knowledge, Mr. Head had no occupational radiation exposure, correct?

A Not to my knowledge, no.

Q So to a reasonable degree of scientific probability, you would rule that out, correct?

A Yes, I haven't seen any evidence to make me think that that's what happened.

Q And Mr. Head is not an atomic bomb survivor, correct?

A I haven't seen any evidence that he is.

Q So any atomic bomb explosions you would rule out as a cause of his AML?

A Yeah, I think we would have heard about that.

Q Well, I mean, in some cases, we get folks who worked on ships that were in the zones.

A No, I don't consider that a risk factor for Mr. Head.

Q And without getting into a discussion of whether electromagnetic field radiation is or is not a cause of AML, would you agree that he did not have any occupational exposure to that and that that -- have you ruled that out as a cause of his AML?

A The same way that we have wording all the other ones, I certainly have not seen any evidence to make me think that that's what caused it.

Q Fair enough. And you've also ruled out alkylating agent therapy as a cause of his AML, correct?

A Yes.

Q And you've ruled out topoisomerase inhibitors as a cause of hi AML, correct?

A I don't think that's consistent with his picture of his disease. So, yes, I don't think that's what it was.

Q And without getting into whether these things actually cause AML, but is it true that you have ruled out to a reasonable degree of scientific probability chloramphenicol and phenylbutazone as a cause of his AML?

A I have seen no evidence that he was exposed to either one of those two things.

Q You do recognize cigarette smoking as a cause of AML?

A Yes.

Q To a reasonable degree of scientific probability, have you ruled that out as a cause of his AML?

A Yes. He didn't smoke, as far as I could tell.

Q And there have been some publications associating pesticide exposure with AML, correct?

A Yes.

Q To a reasonable degree of scientific probability, have you ruled out pesticide exposure as a cause of his AML?

A Same answer. I haven't seen any evidence to make me think that was happening.

Q And there's a whole slew of genetic conditions and familial disorders and autoimmune conditions.

To a reasonable degree of scientific probability, have you ruled those out as a cause of his AML?

MR. PERRY: Objection. Vague.

THE WITNESS: I don't know that that's possible to do. I mean, you can ask me specifically.

BY MR. METZGER:

Q I will. Fair enough. I'll do that.

A I haven't seen evidence that he had an autoimmune disorder.

Q So you would rule those out for lack of evidence, correct?

A Right, right.

Q Have you seen any evidence that he had a genetic condition that's associated with AML, like Fanconi anemia or Klinefelter syndrome, any of those?

A Down's, no.

Q So to a reasonable degree of scientific probability, you would rule out genetic conditions as a cause of his AML, correct?

A Yes.

Q And there's certain familial disorders, such as Li-Fraumeni syndrome that are associated with AML, correct?

A Yes.

Q And you would also rule those out as a cause of his AML, for lack of any evidence, that he had any of those conditions, correct?

A Right. If he had it, it wasn't diagnosed.

Q Okay. There are also some hematologic conditions which have been associated with AML, correct?

A Yes. You mentioned some of them, Fanconi's anemia and others.

Q And there's some that are not actually congenital conditions, for example -- well, let me just

name these off. Aplastic anemia, essential thrombocythemia, myelodysplastic syndrome, myelofibrosis, various myeloproliferative disorders paroxysmal nocturnal hemoglobinuria, polycythemia vera, and thalassemia. Those are all hematologic conditions, correct?

A Yes.

Q And sometimes those predispose or may cause AML, correct?

A Yes, quite frequently.

Q Is it true to a reasonable degree of scientific probability, you have ruled out those hematologic conditions as a cause of his AML?

A Yes. I haven't seen any evidence that he had any of those.

Q Are there any other risk factors for AML that you're aware of that we haven't now just discussed?

A Well, age. Just -- I mean, that kind of takes the position that all AMLs are going to neatly fit into that category and that we can go through and say, "Okay. We didn't have this, this, this, and this; and, therefore, you can understand what a person -- why they got," and that's not true.

Q Right.

A A great majority of AMLs, we have no idea why

they got it. They wouldn't fit into this category or any others. Those are the de novo ones. And those are the ones that I don't believe Dr. Harrison or Dr. Gayle or anyone else can rule out definitively that that's not what Mr. Head had.

Q Well, let's talk about that.

What percentage of de novo AMLs present with abnormalities of chromosomes 5 and 7 in a complex karyotype?

A I'm not sure of the exact number. I think it's somewhere between 10 and 20 percent. It may be smaller.

Q Well, actually isn't it true that about 50 percent of AMLs present with a normal karyotype?

A I've seen that in the literature, yes.

Q And of the 50 percent that present with a abnormal karyotype, isn't it true that only about 1 or 2 percent present with abnormalities in chromosomes 5 and 7 and a complex karyotype?

A I don't know. I would have to look. You're right in that the 10 percent or 15 percent or 5 percent, that would be of the abnormal ones. So it would cut in half for all the AMLs. I mean, it happens, but it's not terribly frequent.

Q At most a few percent, correct?

A Yes. Less than 10, I would say.

Q So based on the probabilities alone, his leukemia would more likely not be a so-called idiopathic leukemia, it would be some type of chronic leukemia, wouldn't it?

MR. PERRY: Objection. Assumes facts not in evidence.

THE WITNESS: No. I don't know how you would make that determination.

BY MR. METZGER:

Q Okay. Well, although you haven't -- you did the same thing that Dr. Harrison did. You rendered a whole bunch of opinions, but you didn't actually provide an ultimate opinion here. So I'll now ask you the same question I asked Dr. Harrison at his deposition.

Dr. Pyatt, to a reasonable degree of scientific probability -- I actually asked him medical probability because he's a medical doctor.

A Yes, I understand.

Q But I'll ask scientific probability to you.

Do you have an opinion as to whether Mr. Head's exposure to benzene from Shell's solvents was a substantial factor in causing his leukemia and death?

A I do have an opinion.

Q And what is your opinion?

A That it did not contribute.

Q During this deposition, have you told me all of the reasons that you have for that opinion?

A I think so. I think they would all be subsumed under that list you're holding.

Q Okay.

A Now, you may ask me something different in the trial or Mr. Perry may; but those are my opinions as we sit here right now.

Q Okay. And are all of the -- is all of the literature that you're relying on for these opinions contained on the CD that you provided and has been marked as Exhibit 4?

A Yes.

Q And you mentioned that these are your opinions right now.

Have you completed your work in this case?

A No.

Q What a shame. What work do you have left to do?

A Well, there will be a lot of work if this actually goes forward and we try this case. I will review all of this literature again. I will make sure nothing has come up in the last month or two that would impact on my opinion or anyone else's opinion. I'll

probably work with Mr. Perry or whoever is going to be there to come up with trial exhibits and how we would go about describing these complex issues to the jury.

Q I understand.

A So all the kind of trial prep would take quite a bit of time, I'm imagining.

MR. PERRY: Specifically, too, we have not provided him with the Moore and Marca, M-A-R-C-A, depositions. He's got the errata sheets, but not the depositions. And, obviously, the expert depositions that will occur, you know, the remaining ones will be sent to him, and he will read and evaluate those, too. So there's additional depositions of Dr. Garabrant and Dr. Bennett that haven't been taken yet. Obviously, he will read those.

THE WITNESS: Yeah, I would read them.

BY MR. METZGER:

Q Let me explore these things with you.

First of all, I fully understand that you keep abreast of the literature and if new studies come down. That's something that --

A Right.

Q -- experts would want to and should be able to rely upon.

MR. METZGER: Stan, if there's any new studies that

come down that impacts his opinions, you need to produce him for further deposition.

MR. PERRY: Sure. If it's a new opinion and it impacts his opinion in a new way or kind of alters a current opinion --

MR. METZGER: Right. Based on new literature.

MR. PERRY: Right. But not just a new opinion that's saying the same thing or something he's already said.

MR. METZGER: No, it's just additional support. A new study has come out. He's relying on this in support of his previously expressed opinion, just so I'll know that there is an additional basis for it. That's all I'll need. But if there's a new opinion, which I'm not saying you can do, I would want it produced.

MR. PERRY: Okay.

THE WITNESS: I mean, it's possible. If it was going to trial next week, I'd say it's not too likely. But now it's been pushed off for two or three months, right?

BY MR. METZGER:

Q Sure. Is there anything that you wanted to review for your work in this case that you were unable to review?

A No.

Q Is there anything that you asked the Steptoe and Johnson firm, Ms. Kahn or Mr. Perry, to send you that was not provided to you?

A No.

Q Have you had discussions with any of the other experts in this case?

A No.

Q Regarding your second opinion, not enough benzene, what are you actually relying on for that opinion?

A That quantitative epidemiology that relates benzene exposures, whether it's air concentrations or cumulative exposure, to where you see a significant increase in the risk of AML.

Q I understand that. But what are you relying on for your opinion that he did not have a sufficient benzene exposure?

A Well, Dr. Daugherty wrote a report and calculated, based on kind of three scenarios, what his cumulative exposure would have been, then also critiqued Stephen Petty's analysis and kind of converted that to a cumulative exposure, which is useful because it allows you to compare it to the literature better. Even if you take Mr. Petty's numbers, his -- whatever he's calling those numbers -- and you say, okay, even if Mr. Head was

exposed at that level -- not the 18.3, you could take those out because of the Thai and the Chinese studies -- but the .93, you take those numbers in the print shops and the paint shops and say, okay, that's not just a peak. That's an eight-hour time-weighted average. That's what he was supposed to the whole day. And you still don't end up with a sufficient dose of benzene to meaningfully increase his risk, based on the literature.

Q Okay. So you're relying on Dr. Daugherty's cumulative-dose assessment?

A Yes.

Q You're actually relying on Dr. Petty's dose assessment for them?

A Yes, I could.

Q I'm not asking if you could. You are?

A Yes, yes.

Q All right. I think we're going to mark the Crane and NAROD papers which you identified previously, just so we're all complete here.

So would you confirm for me that Exhibit 28 is the Crane paper which you identified, and Exhibit 29 is the NAROD paper which you identified?

(Exhibit 28 marked)

THE WITNESS: Yes. This is the Crane paper. And as we discussed at a break, there's an update to this,

if you want that; but there's no new data. So it doesn't matter.

BY MR. METZGER:

Q All right.

A And this one is, yes, the NAROD paper, however you pronounce that.

Q I will give this one back to you since you said it didn't matter.

A You mean, you can keep them? Is that what you mean?

Q This is my copy. Okay.

MR. METZGER: Let me just take a short break and see if I'm done.

(A break was taken)

MR. METZGER: Back on the record.

BY MR. METZGER:

Q I just want to make sure -- I haven't expressly asked it, Dr. Pyatt, are all of the opinions that you have formed in this case set forth on Exhibit 1 and supplemented with what you have testified here today?

A Yes.

Q And all of the materials that you have reviewed for this case have been marked as exhibits today or are on the CD that you provided today and are

identified on the list of materials that you reviewed, which is Exhibit 6, the list prepared by Steptoe, and your own list of materials reviewed --

A It was handwritten. It's smaller; but, yeah, they are all on there, not counting the literature which we've been discussing and you'll find on that disc.

Q Which was Exhibit 4?

A Yes.

Q Okay. Then I think we're done.

A Okay.

MR. METZGER: I propose that the reporter may forward the original transcript directly to Dr. Pyatt. At what address should she send it?

THE WITNESS: 1944 Cedar Ridge Circle, Superior, Colorado 80027.

MR. METZGER: And, Dr. Pyatt, you may sign the transcript under penalty of perjury rather than have it notarized.

We would appreciate if you would make any corrections or changes that you have on the pages where the testimony occurs and also to list them on the correction sheet so we may know where those are.

If you would then forward the -- you have 30 dates from your receipt to do it. We have plenty of time now. If you would then forward the original on to

Ms. Kahn, we will task her with the burden of notifying me of the changes forthwith to the transcript. And then we'll also task her with forwarding the original on to my office and I'll preserve the original and lodge it with the court in advance of trial.

If for any reason the original is lost or not signed, a certified copy may be used with full force and effect.

So stipulated?

MR. PERRY: So stipulated.

(Proceedings concluded at 4:03 p.m.)

*****

STATE OF _____)

)

COUNTY OF _____)

I, the undersigned, declare under penalty of perjury that I have read the foregoing transcript, and I have made any corrections, additions, or deletions that I was desirous of making; that the foregoing is a true and correct transcript of my testimony as contained herein.

EXECUTED this _____ day of _____, _____, at _____, _____.
(City) (State)

_____
DAVID W. PYATT, PH.D.

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

Notary Public in and for said County and State.

REPORTER'S CERTIFICATE

I, CARRIE LAMONTAGNE, CSR No. 13393, Certified Shorthand Reporter, certify:

That the foregoing proceedings were taken before me at the time and place therein set forth, at which time the witness was placed under oath by me;

That said testimony of the witness, the questions propounded, and all objections and statements made at the time of the examination were recorded stenographically by me and were thereafter transcribed;

That the foregoing is a true and correct transcript of my shorthand notes so taken.

I further certify that I am not a relative or employee of any attorney of the parties, nor financially interested in the action.

I declare under penalty of perjury under the laws of California that the foregoing is true and correct.

Dated this 7th day of July, 2010.

_____
CARRIE LAMONTAGNE, CSR No. 13393