SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF LOS ANGELES

STEVEN AND KATHY WORKMAN, Plaintiffs, vs. POMA DISTRIBUTING COMPANY, INC., a California corporation; ADVANTAGE TANK LINES, INC., a California corporation; ULTRAMAR, INC., a Nevada corporation; MILLARD REFRIGERATED SERVICES, INC., a Nebraska corporation; MILLARD REFRIGERATED SERVICES - ATLANTA, INC., a Georgia corporation; MILLARD REFRIGERATED SERVICES - ATLANTA II, INC., a Georgia corporation; and DOES 1 through 100, inclusive, Defendants.	)	No. BC 250793

DEPOSITION OF PHILIP COLE, M.D.

Monday, February 9, 2004

Long Beach, California

REPORTED BY: Lyn Corrin Aaker, CSR No. 6228

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Deposition of PHILIP COLE, M.D., an Expert Witness, taken on behalf of the Plaintiffs, at 401 East Ocean Boulevard, Suite 800, Long Beach, California 90802, commencing at the hour of 10:00 a.m., Monday, February 9, 2004, before Lyn Corrin Aaker, CSR No. 6228, pursuant to Notice of Taking Deposition.

APPEARANCES OF COUNSEL:

For Plaintiffs:

METZGER LAW GROUP
BY: RAPHAEL METZGER
Attorney at Law
401 East Ocean Boulevard
Suite 800
Long Beach, California 90802
(562) 437-4499

For Defendants POMA DISTRIBUTING COMPANY, INC., and ADVANTAGE TANK LINES, INC.:

WOOD SMITH HENNING & BERMAN, LLP
BY: R. GREGORY AMUNDSON
Attorney at Law
611 Anton Boulevard
Suite 1050
Costa Mesa, California 92626
(714) 668-2976

I N D E X

EXHIBITS FOR IDENTIFICATION

WITNESS INSTRUCTED NOT TO ANSWER

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MONDAY, FEBRUARY 9, 2004, LONG BEACH, CALIFORNIA

10:00 A.M.

* * *

PHILIP COLE, M.D.,

the witness herein, having been first duly sworn, was examined and testified as follows:

EXAMINATION +

BY MR. METZGER:

Q. Would you introduce yourself for the record, Doctor.

A. My name is Philip Cole.

Q. And you are an esteemed epidemiologist but not a medical doctor. True?

A. I think you may be wrong on both counts there. I am a medical doctor, and I make no claim to be esteemed.

Q. Oh, okay. Yes, I do see you actually do have an M.D. Okay. Well, Dr. Cole, you've testified a number of times in the past?

A. Yes, I have.

Q. Let's talk about that briefly. Could you tell me approximately how many depositions you have given in your career?

A. I'd say about 70.

Q. And about how many trials have you testified in?

A. Mr. Metzger, when you say "trial," would that include things that occurred in court, but I'm not sure -- some of them aren't actually trials. They may be hearings of a sort.

Q. Sure. Any court hearing or trial.

A. Maybe 10 or 15.

Q. And have you ever testified before any governmental agencies?

A. Again, I need some clarification. Would that be, for example, a scientific body or only regulatory body?

Q. Are you suggesting that regulatory bodies don't follow science?

A. Well, no. I'm sorry if I did. I meant where the purpose was to get information pertinent to a regulation or get information pertinent to some kind of a treatise of a learned nature.

Q. Well, let me try clarifying it this way. What I'm referring to is any time you spoke before a governmental agency, that's governmental, not private, and where you took an oath and swore to tell the truth.

A. Okay. That's helpful. Yes, I have done that perhaps six or eight times in my life.

Q. Okay. Of the approximately 70 depositions that you've given, could you tell me how many of them related

to benzene or some form of blood dyscrasia or hematologic malignancy?

A. The benzene ones would be about 10 or 12, and the blood dyscrasia would be maybe 15 or so, a few more.

Q. Okay. And that would include hematologic malignancies?

A. Yes. Hematologic malignancies where benzene was not the issue.

Q. Well, then, let's see. Regarding those, I assume some were regarding 1,3 butadiene. Is that true?

A. No. I've never testified regarding butadiene.

Q. Oh, what were the subjects of the blood dyscrasia depositions?

A. They were all the same. They were electromagnetic fields, or EMF for short.

Q. Other than EMFs and benzene, have you given depositions regarding any other actual reputative causes of hematologic diseases or malignancies?

A. I don't believe so.

Q. Could you tell me what the last deposition that you gave regarding a benzene case was?

A. I really don't recall now. It's been quite a while.

Q. Do you have a list of litigations in which you've testified?

A. Yes, I do.

Q. Could I have that, please.

A. I don't have it with me. I mean, I will be glad to provide it.

Q. Okay. It was requested. Could we possibly get that faxed here?

A. I think we could do that. It's possible. If we take a break and I call my secretary and if she can find it because it's not on my university file, but I have -- she may have access to it.

Q. Okay. Let's see. She is on Alabama time?

A. Two hours.

Q. Two hours. Would she be in now, or this is the noon hour there?

A. No. It's quarter to 12:00, so this would be a good time.

Q. Okay. Well, let's see. Perhaps we should call for that. I'm trying to think if there's anything else that we will need to call on. You have your CV with you?

A. No, I don't. I just assumed that Mr. Amundson would be bringing it.

MR. METZGER: Do you have it, Greg?

MR. AMUNDSON: No, but I think it's attached to our expert designation. I will look.

THE WITNESS: That's easy to have her send, but I

could have her e-mail it.

BY MR. METZGER:

Q. Actually, e-mail both would be fine. We could just print them out. That might be quickest. And does that have your list of publications?

A. Yes. Do you want to give me a fax number? I'm sorry. E-mail address.

Q. Sure. If she could e-mail it to rmetzger@toxictorts.com.

THE WITNESS: Greg, I assume that you are okaying all of this.

MR. AMUNDSON: Of course.

THE WITNESS: Are we off the record?

MR. METZGER: We'll go off the record. Sure.

(Discussion held off the record.)

BY MR. METZGER:

Q. Well, I can ask you a few questions without the list here. Regarding the approximately 10 to 12 depositions that you gave regarding benzene, were any of those on behalf of a worker claiming to be injured?

A. No.

Q. Were they all on behalf of the defense?

A. Yes.

Q. And did the defense constitute oil companies and manufacturers or distributors of benzene or

benzene-containing products?

MR. AMUNDSON: Objection; compound. Go ahead and answer.

THE WITNESS: The answer is yes.

BY MR. METZGER:

Q. Okay. And in the EMF cases that you've testified in, were any of those on behalf of someone claiming to have been injured, or were those on behalf of the defense?

MR. AMUNDSON: Same objections. Go ahead.

THE WITNESS: Sorry. They were all on behalf of defense.

BY MR. METZGER:

Q. Of the 70 depositions that you've given, how many, if any, of them were where you were engaged as an expert or testified as an expert on behalf of a person claiming to have been injured?

A. Three or four.

Q. Can you identify what they were?

A. When you say "they," do you mean the case or the agents?

Q. However you can.

A. The agents were two. The first one is DES, which is diethylstilbestrol, and the outcome was clear cell adenocarcinoma of the genital tract in young women. And the other agent was menopausal estrogens, specifically

Premarin, and the outcome was breast cancer.

Q. With respect to the 70 depositions that -- approximately 70 depositions that you've given, excluding pharmaceuticals or medical devices, were all of the depositions on behalf of the defense?

A. Yes.

Q. Of the approximately 10 to 15 trials or hearings that you've testified in in court, how many of those concerned benzene?

A. Perhaps six or so, maybe a little less than half of the total.

Q. And in those cases, at those trials did you always testify on behalf of the defense?

A. Yes.

Q. Of the 10 to 15 trials that you've testified in, have all of them been for the defense?

A. No.

Q. Excluding pharmaceuticals and medical devices, have they all been on behalf of the defense?

A. I'll need some clarification. The agent in question is DES. It was administered to one person as a pharmaceutical, but the person who was injured was not the person who received it as a pharmaceutical. So I'm not sure what the answer to your question is.

Q. The injury was from a pharmaceutical agent. It

was an in utero exposure, and the daughter was a DES daughter. Is that what we're talking about?

A. Yes.

Q. Other than that, were all the trials for the defense?

A. Yes. And the other one -- no. My answer is yes.

Q. Okay. Now, of the approximately six to eight times you've testified before governmental agencies, have any of those concerned benzene?

A. No.

Q. What have been the subjects of those testimonies?

A. The electromagnetic fields, formaldehyde, many years ago saccharine, chlorpyrifos, and an agent whose chemical name I have forgotten, but it was the principal ingredient in a shampoo that is used to rid children of lice.

Q. Lindane?

A. I think that's correct. I think Lindane was either the or one of the principal ingredients.

Q. All right. When you testified before the governmental agency regarding EMF, what agency was that?

A. Well, there were several state agencies. Shall I mention which ones they were?

Q. Sure.

A. State of Maine, State of New Jersey, and

Illinois. There was a federal agency. It was actually a congressional committee. I can't remember now what committee it was. Oh, and, also, State of Florida.

Q. Approximately when was this testimony before the congressional committee?

A. That would have been quite a while ago, about 1987 or '88.

Q. On whose behalf were you testifying?

A. When you say "on whose behalf," you mean who was sponsoring the appearance there?

Q. Yes. Who paid you?

A. I believe that was paid -- well, I should say that I'm not sure, but my best recollection is that it was on behalf of EPRI, E-P-R-I.

Q. And what is EPRI?

A. That stands for the Electric Power Research Institute.

Q. That's an industry organization, according to your understanding?

A. Well, the financing of the institute comes from industry, yes.

Q. And when you testified regarding formaldehyde, what agencies was that before?

A. I don't recall.

Q. And on whose behalf did you testify for

formaldehyde?

A. I'm sorry. Isn't that what you just asked?

Q. I asked you what agency.

A. In front of what agency? I'm sorry. It was in front of EPA.

Q. About when was that?

A. Mid 1980s.

Q. And was it some industry trade organization on whose behalf you testified?

A. No. It was on -- I think different people were represented, sponsored by different corporations. I believe I was sponsored by Shell Oil Company.

Q. Chlorpyrifos, what agencies did you testify before regarding that?

A. I believe it was a scientific advisory board of NIOSH.

Q. About what year was that?

A. About 1995 or so. I'll just say that there is a publication that will be listed on my CV which will give us specific information on that.

Q. Okay. And who sponsored your testimony?

A. That was sponsored by a chemical company. I can't remember now whether it was Dow or Dupont. I think it was one or the other of those two.

Q. Was it the register of chlorpyrifos?

A. I really don't know.

Q. Do you recall generally the thrust of your testimony at that hearing, what it was about?

A. Chlorpyrifos?

Q. Yes.

A. It was actually as a participant in a roundtable discussion, and I don't recall my specific assignment or, indeed, even if I had one. But I can tell you that the purpose of the roundtable was to review the available epidemiologic information and to make a recommendation to the agency as to what, if any, action they might take.

Q. And what recommendation, if any, was made?

A. I believe there were two. I think one was that the available evidence did not support the idea that chlorpyrifos was a cause of any form of cancer in human beings, and that the research that the agency had done and which they were considering either updating or upgrading in some way should, in fact, have those improvements made if possible.

Q. What improvements?

A. Well, that was not clear to us either. It was simply stated that they were considering upgrading the study that they had done.

Q. Okay.

A. Whether it meant extending it in time or size or

what, either was not known at that time or was known at that time but I have forgotten.

Q. And when you testified regarding Lindane, what agency was that before?

A. That was in front of a committee of the Food and Drug Administration.

Q. About when was that?

A. That would have been about 1995.

Q. And who sponsored your testimony?

A. The manufacturer of the shampoo.

Q. Do you recall who that was?

A. No. I just remember that it was a relatively small pharmaceutical company.

Q. Okay. Now, have you in the past done work for industry apart from the testimony of the cases that you've worked on?

A. Yes.

Q. Have you done work for the American Petroleum Institute?

A. I have done two things that I can recall for API.

Q. What are they?

A. One was I wrote or I coauthored a chapter in a book or monograph that they produced, and the other was at their request I attended a meeting of their executive body to discuss certain issues with them regarding time trends

in cancer.

Q. Okay. We'll talk about these. What was the subject of the chapter in the book?

A. The chapter was in effect what is the current state of knowledge regarding, and based on the epidemiologic information, the status of gasoline as a human carcinogen. And, in fact, particularly it might have been limited. I'm not sure now. It might have been limited to unleaded gasoline.

Q. And in what book was that published? Do you recall?

A. Well, again, if we had my CV, it would be cited there.

Q. Very well. We'll wait for your CV. Okay. Now, regarding the meeting of the executive body regarding time trends in cancer, what was this executive body, according to your understanding?

A. Mr. Metzger, I was about to say my understanding is a little fuzzy now, but certainly the CEO of the institute was there. There were perhaps seven or eight other people. As I recall, three or four of these people were credentialed in science, and the other three or four were, let's say, using the term generally, policy makers and advisors.

Q. Who were they?

A. You mean their names?

Q. Yes.

A. I don't remember the names.

Q. Any of them, the scientists?

A. I don't remember any of the names, not even the CEO.

Q. Was any paper prepared regarding this meeting?

A. No.

Q. What was the general thrust of the advice that you gave the committee?

A. I didn't give them any advice.

Q. Did they ask you anything?

A. Did they ask me anything? Yes. They had asked me beforehand to come and make a presentation along certain lines.

Q. And you did that?

A. Yes.

Q. What was the subject of your presentation?

A. They had heard that I had said -- in fact, I had said it at a meeting of the National Cancer Advisory Board, and I'm sorry if I didn't mention that in response to your previous questions. I'm not sure whether that would have qualified or not.

Q. That's okay.

A. That I had said that we were soon to experience a

downturn in the overall cancer mortality rate and various consequences of that and the reasons for it, and they wanted to hear more about that.

Q. What are the consequences you're referring to?

A. The extension of life among adults.

Q. Okay. Anything else?

A. No.

Q. And the reasons for it?

A. The reason, there being two principal reasons. One is the plateauing -- it hadn't happened yet at the time, you understand, but the prediction of the plateau in mortality rates from lung cancer and the --

(Telephone interruption.)

BY MR. METZGER:

Q. You were saying plateauing of morality from lung cancer?

A. And advances in treatment and diagnosis and treatment or let's say medical care in general.

Q. Is there anything else that you have done over the years for the American Petroleum Institute that you can think of?

A. No.

Q. Have you ever --

A. Well, wait a minute. I do remember a third thing. Unfortunately, I don't remember what it was. I

just remember that it existed. I did go to their headquarters in New York and did attend a roundtable discussion of some sort. I don't remember what the issue was.

Q. Did you ever receive any contracts or have any contracts with the American Petroleum Institute?

A. I certainly don't have any now, and for the three instances that I have mentioned I was paid. I don't believe it was under contract but, rather, that I simply bill them after the fact.

Q. So your best recollection is you've never had any contracts with the American Petroleum Institute?

A. That is correct.

Q. Approximately how many contracts have you had with oil companies?

A. I need to ask a question of clarification. When you say how many have I had, do you mean that were personal with me in a private capacity or with the university and related to work in which I was either the principal or a significant participant?

Q. Either of those two and, also, of any contracts with any consulting organizations with which you have been affiliated.

MR. AMUNDSON: The latter might be a little vague, but go ahead if you can answer the question.

THE WITNESS: Let me try to be systematic about it. As far as contracts with me, I actually recall only one. That was with Texaco perhaps some 15 or so years ago.

BY MR. METZGER:

Q. Regarding what?

A. It was regarding a risk assessment for benzene and leukemia, and it resulted in a publication that appears on my CV and which acknowledges that support.

With regard to the university, there were three or four contracts for our research in which the university was actually the contracting party, not me. And two or three of these were with the Shell Oil Company. I'm sorry. Did the question relate to oil companies?

Q. Oil companies or petrochemical companies. I'm not limiting it to Shell Oil. It could also include Shell Chemical, for example.

A. Well, actually, when I said Shell Oil, I perhaps should have said Shell Oil or Chemical. It's a distinction I don't keep very clear in my mind.

Q. Nor do I.

A. There was at least one with a company which at the time was called Ciba-Geigy, now known as Novartis. There was one with an entity whose name I cannot recall, but I can tell you the spirit of it, and that is it's a

manufacturers' trade association of the synthetic rubber producers. That's all that I recall.

Q. Okay. Could you tell me approximately regarding the contract that you personally had with Texaco what the funding of that was?

A. I really can't remember.

Q. Can you estimate? Was it five figures or six figures or seven figures?

A. By "five figures" you mean under $100,000?

Q. Yes.

A. Yes. It was under $100,000. In fact, it was probably, as I recall, in the vicinity of $10- to $15,000. But I would point out that that was not all paid to me. There were two other participants in that.

Q. And the contracts that you had with Shell Oil, what was the funding for those?

A. Again, I want to point out that I did not have these contracts.

Q. The university.

A. Those contracts would have been for six figures, that is in excess of 100,000 and less than one million, and, in fact, much closer to 100,000 than to one million. But I was not the principal investigator in those, and I really don't recall the budget figures.

Q. Okay.

A. I'd like to mention another one just so that it doesn't appear later that I was not forthcoming. There was also one with Amoco Company, which was I believe in the vicinity of $75,000.

Q. Were the contracts with Shell Oil regarding benzene?

A. Two are them were, in fact, primarily focused on benzene and were for the conduct of a retrospective follow-up study or case control study of leukemia in one of their refineries, specifically the Wood River refinery. And that work led to two or three publications which are included in my CV.

Q. And the other one?

A. The other Shell?

Q. Yes.

A. That one was not focused on benzene. As I recall, it was primarily concerned with pesticides which had been manufactured at a facility that Shell -- that was actually owned by the United States Government but operated for the United States Government by Shell. And I don't think it was focused on any particular chemical, but on the health of the work force.

Q. Did that result in a publication?

A. Yes.

Q. And that's on your CV?

A. Yes.

Q. The Amoco consultation, what was that regarding?

A. That related to a perceived outbreak of brain cancer at a research and development facility that Amoco ran in a city that's a suburb of Chicago. Its name escapes me right now.

Q. Naperville or something.

A. It is Naperville, yes.

Q. And the synthetic rubber producers, what was that about?

A. That was primarily focused on butadiene.

Q. And did that result in a publication?

A. That work which has been renewed now several times, so the span of time is probably close to 12 years, has resulted in a number of publications, perhaps four or five. I think I am included in the authorship of only one or two of those, and yes, they would be on the CV.

Q. Did these publications explore hematopoietic malignancies?

A. When you say "these publications," I'll take it to mean all of the ones I've mentioned, and I can answer yes with the exception of the Amoco.

Q. I'm talking about the synthetic rubber ones.

A. The principal focus was on what I'll call LHC, lymphatic hematopoietic cancer.

Q. And was that also true of the Ciba-Geigy?

A. I'll need to think for a minute about that one. The answer is no.

Q. Okay. Do you recall what that was about generally?

A. It was primarily focused on two things. One was adverse outcomes of pregnancy in the female employees, and secondly on the health of the work force in general.

Q. Was there a suspect agent that you recall?

A. The suspect agent was a category of compounds called triazenes.

Q. Could you estimate for me the funding for the projects that you consulted on, that the university had and on which you consulted for the synthetic rubber manufacturers?

A. I really don't know what the budget has become. I don't even recall what it was in the first few years. I was never the principal investigator on it.

Q. Do you know whether it was a six- or seven-figure contract?

A. Anything I say would be a guesstimate, but I would say it would probably have run somewhere in the vicinity of $75,000 to $100,000 per year, each of the contracts running for several years. And I want to just make it clear that you used the expression in that

question that I had consulted for. I was not a consultant. I was a collaborator.

Q. Fair enough.

A. And I just want to make it clear that I was not paid. That is my university was reimbursed for my salary.

Q. When you've done these projects and the university had the contract, has your salary reflected any type of compensation, remuneration, or bonus due to the amounts that these contracts brought into the university?

A. Well, certainly not a bonus. There is no bonus in the university setting, at least not that I've ever received or known of. Whether or not my salary was influenced -- let me phrase it this way.

Whether or not the person who decided whether or not I would receive increases in pay took this into consideration, I can only say the following: For many of these years I was the head of the department, so the circumstance was that I was in a position to recommend my own salary. And all I can say is that the recommendation that I made at least in those years, which was about 15 of the 20 or so years that I was on faculty at UAB, reflected my perception of my worth to the department, which included teaching, mentoring, particularly young faculty, and also research and, yes, the amount of research funding that I thought I was at least in part instrumental in

bringing into the department. So I don't recall that my recommendation to my superior, who would have been the dean of the school, was ever not accepted, so I guess the short -- that's the long answer. Maybe the short answer is yes.

Q. Fine. I understand. Thank you. What about have you ever been a private consultant through a consulting firm?

A. I have I guess the word would be helped out or participated in projects that were being done by consulting firms, yes.

Q. And have you had any ownership interest in any of these consulting firms?

A. I had an ownership interest in one of these firms for some time, yes.

Q. What was that firm?

A. That firm, which is no longer in existence, was called the New England Epidemiology Institute.

Q. Okay. What types of research or projects did that organization do?

A. Just for clarity, do you want to know what they did, or do you want to know in which ones I participated?

Q. We'll take the ones you participated in.

A. I participated in one -- let me start over again. I participated in many in which they asked me to review

the report or work product that had been prepared by their staff, but I had no direct involvement in the actual procurement of the contract or the conduct of the research. I did have an active role in one that related to the projection of the number of cases that would be filed against the Johns Manville Company as a result of asbestos exposure.

I also participated -- well, no. I have to retract that. I don't recall another one. The company as a whole did epidemiologic research of all sorts.

Q. I'm sorry?

A. The company in a larger sense -- you asked what the company did as well as what I did. The company provided epidemiologic services of many types.

Q. That was this New England Institute?

A. Yes.

Q. Are there any other consulting firms that you've been affiliated with?

A. I don't like to use the word "affiliated with" when the relationship was essentially a strictly ad hoc relationship. But the answer is yes, and the company is Exponent.

Q. And what type of work have you done for Exponent?

A. I have done two things for them. One is that I participated in a committee which they convened on the

subject of the appropriate classification of carcinogenicity to humans of dioxin. That also resulted in a publication that is listed in my CV. And the other project was the participation in an advisory group which was pulled together for the purpose of evaluating research that had been conducted by a governmental agency. I'm sorry I've forgotten the exact name of it, but it relates to occupational health in Scotland.

Q. Have you ever done any consulting for the Chemical Manufacturers' Association or the Manufacturing Chemists' Association or I think it's now called the American Chemistry Council? They don't like the name "Manufacture" in there any more, I guess.

A. And the first part of the question?

Q. Have you ever done any consulting for that organization?

A. I don't know that it would be called consulting, but I'll tell you what the activity was. I have on several occasions given talks to either their own membership or to more general audiences at meetings that they had convened.

Q. Talks regarding what?

A. I really don't recall.

Q. About how many talks?

A. Two that I recall.

Q. Were they given before any certain committees of the CMA?

A. One was given to a group of people, all of whom were either members of the CMA, if there is such a thing as that, or scientists or executives of the companies that support the CMA. But I don't recall the subject.

Q. All right. Well, let's start talking about this case, and we'll get back to some of these other things when we have your CV and the case list. You understand that you've been engaged as an expert in this case, and you've been asked to form opinions on certain topics. True?

A. I've been asked to form opinions?

Q. Have you not been asked to form opinions on certain topics?

A. Yes.

Q. Can you tell me, please, what the opinions are that you've formed regarding the present case.

A. If I recall correctly, there is a document that states what I will be or may be asked to testify about. Is that the same thing that we're talking about?

Q. Well, not really. I assume that was prepared by counsel. I'd like to know what your opinions are as opposed to what counsel says you might talk about.

MR. AMUNDSON: I think what he's really asking

for is if you could give him kind of a highlight of your table of contents of the various subjects on which you will be opining at trial. Just kind of a quick hit list, and he will go through each of your opinions and ask you more definitive opinions.

BY MR. METZGER:

Q. That's true. I'll ask you for the foundation, the basis, and the reasons. But first I'd like to get the landscape of what you're going to be testifying about.

A. I think some are fairly obvious. Some are not at all obvious to me. But I suppose I will be asked what I consider to be the causes of the myelodysplastic syndromes. I suppose I would be asked and would venture an opinion as to whether or not the MDS's are caused by benzene. That might incorporate any of a number of subopinions regarding dose response and the like.

I might be asked to opine as to what kind or which type of MDS Mr. Workman had. I might be asked and would opine whether or not he had acute myelocytic leukemia, hereafter AML, and I might be asked and try to be responsive with an opinion as to whether or not his particular condition was caused by his particular exposure to benzene or, possibly as a variant of that opinion, whether or not it was caused by the benzene that would have been supplied by Mr. Amundson's client. I don't know

whether I will be asked about the possible role of smoking in Mr. Workman's illness.

Q. Okay. Any other general topics, or should I start exploring these?

A. I can't think of any more general topics.

Q. Okay. Well, let me ask you, then: What do you consider to be the known causes of myelodysplastic syndromes?

A. I don't know of any.

Q. Well, have you conducted any literature searches to ascertain the literature that pertains to the etiology of the myelodysplastic syndromes?

A. Yes. In fact, about six or seven years ago, granted that may be a little out of date, I actually published a review of the epidemiology of the MDS's. On that particular one we wouldn't necessarily have to wait for the CV if you're interested in it because I brought a copy along. Since then I have maintained a familiarity with the literature on the epidemiology and, hence, I think the causes or suspect causes of MDS.

Q. Well, could I see the review article that you're speaking of?

A. Sure. It was actually an invited talk that I published.

Q. Okay. And you're referring to the article in

"Leukemia Research" which we'll mark as Exhibit A.

(A copy of the aforementioned document was marked by the court reporter as Plaintiffs' Exhibit+ A for identification; attached hereto.)

BY MR. METZGER:

Q. And who invited you to give this talk?

A. Dr. John Bennett.

Q. And did you know Dr. Bennett before this?

A. Yes.

Q. How did you know him?

A. I had met him previously at several scientific meetings. I also met him on at least one occasion at Wood River.

Q. And that was in connection with Shell's investigation of the leukemias at that facility on which you were engaged as a consultant, and Dr. Bennett was engaged as a consultant?

A. No, it wasn't.

Q. Please tell me about it.

A. I think that that particular meeting where John Bennett and I -- in which John Bennett and I both participated, and there were other people as well, was actually on the issue of MDS.

Q. And who participated in that meeting?

A. The participants were Dr. Sally Cowles,

Dr. Elizabeth Delzell, Dr. John Bennett, me. There were several technical people who were employed at the Wood River refinery and one or two management people as well.

Q. Did Dr. Bennett, to your knowledge, review any of the slides of the MDS and AML cases out of Wood River?

A. I have no knowledge of that.

Q. Was that your first meeting with John Bennett?

A. No. I had met him several times previously.

Q. At what?

A. At scientific meetings.

Q. Such as?

A. Well, we're talking about a 20- or 25-year time span, and I just don't recall. He was a person who when I met him at this meeting I recognized and walked directly up to him and said, "Hello, John. How are you?" So I had met him before several times.

Q. Had you met him at the meetings of the American Society of Hematology?

A. No.

Q. Had you met him at any other medical meetings?

A. I believe I met him on at least one occasion at a meeting of the Society for Epidemiologic Research.

Q. Any other meetings that you recall meeting him at?

A. No. I mean, there were other meetings, but I don't recall which ones they were.

Q. Before you met with him at Wood River, had you met with him in connection with any other benzene leukemia clusters or investigations?

A. No.

Q. John Bennett, I believe, had once prepared a report to the American Petroleum Institute arguing against medical monitoring of benzene-exposed workers. Did you have any involvement in that?

A. The meeting at Wood River was for the purpose of discussing that issue. I don't know -- I don't recall whether his report -- and, by the way, I don't have a recall, a recollection of that report. I don't know whether that report preceded or followed that meeting.

Q. I'm speaking actually of a report that he prepared for the American Petroleum Institute many years earlier than Wood River.

A. May I ask in what year or about what year that report was?

Q. I'd have to dig it out. It was around the time of the Benzene Emergency Temporary Standard, so late '70s.

A. Late '70s. Yes. That would be many years before the Wood River meeting. And you're asking whether or not I influenced him or had any discussions with him about

that report?

Q. Yes.

A. No.

Q. You've never seen or heard of that report?

A. I have no recall of ever seeing it.

Q. Okay. Well, let's see. When did you first conduct a search of the literature to investigate causal associations for myelodysplastic syndromes?

MR. AMUNDSON: Just for the record, if I can have a continuing line on this, the term "causal associations" is objected to as vague and ambiguous and contradictory. You can answer or respond to that question in your own words.

MR. METZGER: He is an epidemiologist. He can certainly deal with it.

MR. AMUNDSON: I'm sure he can.

THE WITNESS: I would say that I did not do ever a literature search that I would have characterized as oriented towards -- in any direct sense towards the causes or causes of MDS but, rather, was directed towards the epidemiology of MDS, which I intend to mean as a broader subject.

BY MR. METZGER:

Q. When did you first do literature search regarding the epidemiology of MDS?

A. May I see that review article? The first search probably would have been done in about 1994, this paper being published in 1995 but actually is an elaborated version of a talk that I gave in 1944.

Q. '94?

A. What did I say?

Q. '44?

A. 1994.

Q. Now, incidentally, did you receive any funding or compensation for this publication or the presentation that you gave?

A. I recall with regard to this -- may I look at it to refresh my memory? I recall certainly receiving reimbursement for my expenses in going to Chicago to make the presentation. I don't recall -- I don't believe I was compensated in any other way.

Q. Was the university, to your knowledge?

A. No.

Q. Now, would you happen to have -- when you did this search in 1994, did you do that using on-line data bases?

A. No.

Q. How did you do that research, that search?

A. It actually was done by a graduate student working for me.

Q. Who is the graduate student?

A. He is one of the co-authors on the report. His name is Warren Sateren.

Q. Do you know how Mr. Sateren did the literature search?

A. He did not use any kind of computerized data base. He essentially worked from a recent textbook and worked back from that.

Q. What textbook did he use?

A. I think the one that he used was the one called "Blood."

Q. By Jandl?

A. Yes.

Q. And that was the 1990s? No, it couldn't have been. Which edition of Jandl did he use?

A. I don't remember. It would have been whichever one was current at the time.

Q. I think the one that I have is '96, which would post date this. Okay. And did Mr. Sateren come up with a list of articles from that method?

A. Yes. He came up with a fairly extensive list.

Q. Of approximately how many articles?

A. I don't remember.

Q. Do you have that list?

A. No. The publication includes a list of the

references that would actually have been included in it.

Q. Okay. Were there any other articles on that list other than those included in this publication?

A. Oh, yes.

Q. Could you tell me what they are?

A. No.

Q. Have you ever done an on-line search?

A. You mean on this subject or in general?

Q. In general.

A. Yes.

Q. And do you find the on-line search to be helpful in being sure to obtain the literature existing on topics?

A. Yes.

Q. Did you tell Mr. Sateren that he should do an on-line search when he did this?

A. No.

Q. Why not?

A. I felt that the first thing was that I wanted to see what he would do. And when I got the list that he developed, I looked at it, and I looked in a textbook, and I wanted to see whether or not there was likely to be any significant omissions from it. And I decided there was none, and so I selected from his list the papers that I thought would be helpful to our writing this review.

Q. And what was the textbook that you referred to?

A. It was a textbook by Schattenfeld and Fraumeni called "Cancer Epidemiology and Prevention." I might have also looked --

Q. That was the first edition of that?

A. No. But let me finish, if I may.

Q. I'm sorry.

A. I might have also looked in both "Blood" and in this book, "Clinical Hematology."

Q. Wintrobe?

A. Yes.

Q. And the Schattenfeld and Fraumeni book, was that the first edition?

A. No. It would have been the edition prior to the current one. And I can't tell you what number that would be. I think the current one is perhaps Edition 5, so that would have been Edition 4.

Q. What is the title of this textbook?

A. It's called "Cancer Epidemiology and Prevention."

Q. Right. Okay. And first of all, is MDS a cancer?

A. No.

Q. And can you tell me what you would expect to find regarding myelodysplastic syndrome in Schattenfeld and Fraumeni's textbook?

A. Well, now, wait a minute. When you ask me what I would expect to find, do you mean as if I had never gone

there before?

Q. No. Specifically regarding MDS, since it's not a cancer.

A. The textbook includes a number of conditions which might be labeled preneoplastic or paraneoplastic conditions, just as does the book "Clinical Hematology," for example. So I'm not sure. When you ask me that question what I would expect to find, I guess the answer is that I would expect to find some level of discussion and description of the epidemiology of the conditions known as the MDS's, and I did.

Q. Okay. Do you recall specifically whether you consulted Wintrobe's "Clinical Hematology" in doing this work?

A. Well, unfortunately, my memory of "Clinical Hematology" would be very difficult to isolate from my current perceptions of what's in the book, which is a different edition. So I think the answer to your question is no.

Q. Do you recall specifically whether you consulted Jandl's "Blood" in the course of this literature search?

A. I can't say for sure that I did, but I believe I did.

Q. Do you recall any other textbook or any other means by which you familiarized yourself with the extent

literature regarding the epidemiology of myelodysplastic syndromes at the time in 1994?

A. No.

Q. Since 1994, have you ever done a computerized data base literature search regarding epidemiology of MDS?

A. No.

Q. Have you ever done any other noncomputerized data base search for literature of the epidemiology of MDS?

A. I'm not sure whether the answer to the question is yes or no. Maybe I should describe what I have done.

Q. Sure.

A. I do try to stay current with the literature on the epidemiology of LHCs, and as part of that one of the things that I do is look at the references that accompany the papers that I get. And if one came to my attention which I did not have and which I thought might be of interest to me, either regarding the MDS's or one of the LHCs, then I would simply obtain that.

Q. And do you have a list of those articles that you obtained?

A. I don't keep such list, no.

Q. Can you identify them for me?

A. When you say "identify" them to you, do you mean can I provide you with a list of the papers?

Q. Identify them by author and year, somehow

identify them.

A. It's not the nature of the identification. It's the category. What is it that we're referring to here; the literature on leukemia or the literature on MDS or the literature on MDS that I got in that particular way?

Q. We were talking specifically about the epidemiology of MDS. That's what I'm talking about.

A. And you want me to tell you, if I can, the citations that are relevant?

Q. I'm not asking you to determine what's relevant. I'm asking if you can identify for me citations simply by author, preferably author and year, of epidemiology studies concerning myelodysplastic syndrome that you've become familiar with since the publication of your article in "Blood" and the research that you did for that in 1994.

A. There are only two papers that come to my mind. There are other papers, but I don't -- I'm not in a position to be able to tell you who authored them.

Q. Fine.

(Telephone interruption.)

MR. METZGER: Let's go back on.

Q. Dr. Cole, you were about to tell me of two papers that you recall regarding the epidemiology of MDS which you reviewed since you prepared your publication in "Blood" in 1995.

A. Actually, I think it's twice you mentioned the journal as "Blood." It's actually "Leukemia Research."

Q. I'm sorry. It is "Leukemia Research." You're right.

A. I don't recall whether either of these papers was specifically or even primarily oriented towards MDS, but I do recall that there was information in them pertaining to MDS. And one is a paper by Hayes and others, and the other one is by Yin and others, and both reflect epidemiologic research done in China.

Q. Are there any other epidemiology studies concerning MDS that you have reviewed since the research that you did for your article in "Leukemia Research" in 1995?

A. There are others, but I don't recall them at present.

Q. And have you reviewed any of those for purposes of this case?

A. May I take a minute to look through my file?

Q. Certainly.

A. (Witness peruses document.)

There is one other paper for a fact I reviewed in connection with this case. It stands out only because it was provided to me yesterday in a package of materials by Mr. Amundson. Since I got it, I looked at it, and I

believe there is another one in here.

Q. Are you referring to the Albin paper?

A. Yes. Do you want me to cite it for the record?

Q. Perhaps -- I'll do that. You're referring to the Albin paper from 2003 "Cytogenetic and Morphologic Subgroups of Myelodysplastic Syndromes in Relation to Occupational and Hobby Exposures." Correct?

A. Yes. That's the only other one -- well, it's actually the only one that I specifically reviewed for this case. I think I mentioned the other two pages in connection with literature that I have reviewed since my own review.

Q. Let's just take a moment now and deal with some of the documents. There is a collection of papers including the Albin paper which you just pulled out of an envelope. The envelope says Philip Cole, M.D., as the recipient, and the sender is R.G. Amundson, Wood Smith Henning & Berman. Correct?

A. Yes.

Q. And are these all papers which Mr. Amundson gave you yesterday to review before your deposition?

A. I don't know. I have to look through it and see whether or not some things that I brought with me have gotten mixed in or things that he did send have gotten pulled out.

Q. Please take a look and answer that.

A. (Witness peruses document.)

Let me begin my answer to your question by saying that everything that I'm holding in my hand was provided to me yesterday by Mr. Amundson. However, a number of things here were previously available to me.

Q. Let's talk about them, if I might.

A. Okay. Could I -- it might help if I finish by going through this to see whether or not there are any things in here that actually came with this pile.

Q. Oh, sure. Please do that as well.

A. (Witness peruses document.)

Okay. There is not.

Q. Okay. Then let me just ask you these questions. Is yesterday the first time that you saw the article by Albin?

A. No.

Q. You had reviewed that previously?

A. I hadn't reviewed it. I had seen it.

Q. You had seen it, but you had not reviewed it previously?

A. That's correct.

Q. So the first time you reviewed it, actually studied it, was yesterday or today after Mr. Amundson provided it to you. Correct?

A. I wouldn't say I have studied it. I have reviewed it.

Q. You have reviewed it. Fair enough. The article by Sandler "Cigarette Smoking and Risk of Acute Leukemia," JNCI '93, had you seen that before yesterday?

A. Seen it, reviewed it, and studied it.

Q. You did that at about the time that it was published?

A. I really don't recall.

Q. The article by Korte, K-o-r-t-e, in "Environmental Health Perspectives" entitled "The Contribution of Benzene to Smoking-Induced Leukemia," had you seen that before yesterday?

A. Yes.

Q. And had you studied that before yesterday?

A. Yes.

Q. There is an abstract by Marsh, "Mortality Patterns Among Petroleum Refinery and Chemical Plant Workers," "American Journal of Industrial Medicine 1991." Had you seen that before yesterday?

A. Well, I have not actually seen the abstract in isolation before. I have that paper.

Q. And have you studied that paper before?

A. Yes, yes.

Q. There is an excerpt from the report to the

scientific review panel on benzene prepared by the California Department of Health Services in 1984. Had you seen that before yesterday?

A. I have seen the whole report.

Q. There is something printed off the Internet on Polycythemia Vera. Does that have anything to do with this case in your view?

A. Not that I could tell.

Q. Nor could I. There is an article by Madl and Paustenbach, M-a-d-l, "Airborne Concentrations of Benzene Due to Diesel Locomotive Exhaust in a Roundhouse." Had you seen that article before yesterday?

A. Yes.

Q. And had you studied that before yesterday?

A. Yes.

Q. What was the connection that you studied that article? It's not an epidemiology article, is it?

A. Yeah, I think it is. It is not epidemiology per se, but it is highly relevant to epidemiology, I believe.

Q. What was the context that you came across that article?

A. I have been involved as an expert witness in a number of cases in which the putative cause of a disease is diesel exhaust or diesel fuel exposure, and it is in that context. And let me just say -- excuse me -- I

should have acknowledged that in response to one or more of your previous questions. I have never actually been deposed in a diesel case.

Q. I see. How many such cases have you consulted on?

A. Four that I can recall.

Q. Are all of these consultations on behalf of industry?

A. Yes.

Q. Do you recall the names of the cases in which you consulted?

A. When you say "the name," you mean the last name of the first plaintiff?

Q. Yes. Some way of identifying it.

A. I do recall some of them.

Q. Please identify them.

A. Okay. One I know as the case of Alexander. I think it's versus Norfolk Southern Railroad. That case has recently been settled. The next one is Dampier, D-a-m-p-i-e-r, also versus Norfolk Southern. The next one -- and I'm actually going back in time -- is Shapona, S-h-a-p-o-n-a. I can't remember who the defendant was. I think it might have been a city. He was a firefighter.

Q. Can you remember the fourth?

A. The fourth I don't remember the name, but the

defendant I do recall was also Norfolk Southern.

Q. In these cases did you prepare written reports?

A. In the last one no. Now I'm coming forward. In Shapona, yes; in Dampier, yes; in Alexander, no.

Q. Do you know whether -- strike that. Were these reports given to anyone other than the defense attorney who had engaged you?

A. I have no idea.

Q. Have you prepared any publications regarding -- which derive from any of these reports?

A. No.

Q. With respect to these four cases, were they all lung cancer cases?

A. No.

Q. Were any of them leukemia or MDS cases?

A. No.

Q. The next article in this stack by Pogoda "Smoking and Risk of Acute Myeloid Leukemia," did you see that article before yesterday?

A. Yes.

Q. And did you study that before yesterday?

A. Yes.

Q. There is an excerpt from --

A. It's a textbook.

Q. Yes, it is. What's the name of the author?

A. The principal editor is DeVita.

Q. Right. Of course. This is the 5th edition from 1997 regarding myeloid leukemias. Had you read this excerpt from DeVita before yesterday?

A. Excuse me. May I look at it just a moment?

Q. Certainly.

A. The reason I asked to look at it is I think this is the 6th edition, and you said 5th. But the answer is no, I have not looked at that material in it before. It does not say 6th edition.

Q. I'm sorry. I must have misspoken. There is attached to that stapled to it a copy of Schnatter's article "Determination of Leukemogenic Benzene Exposure Concentrations." Have you seen that article before?

A. Oh, yes.

Q. And did you study that before yesterday?

A. Yes.

Q. There is an abstract by Nagean, N-a-g-e-a-n, on Polycythemia Vera. We'll put that in an applicable pile.

There is an excerpt from the toxicological profile for benzene, 1997, by the ATSDR. Have you seen that publication before yesterday?

A. Yes. The whole publication.

Q. And did you study it?

A. Yes, I have studied it.

Q. There are some photographs here of the facility. I'm sure you didn't see those before yesterday. Right?

A. That is true.

Q. There is an article by Fedoruk, et al., "Measurement of Volatile Organic Compounds Inside Automobiles." Had you seen that article before yesterday?

A. No.

Q. Have you studied that article?

A. No.

Q. There is the ACGIH. I assume this is the TLV documentation for benzene. Have you seen that before?

A. May I have a look at it when you're through?

Q. This is actually copyright 2001. I will see where it ends here.

A. (Witness peruses document.)

I can't say that I have seen this particular version before.

Q. All right. There is a deposition summary of Jimmy Morrison, M.D., and also one of Don Kuchenbecker. Have you read those?

A. No.

Q. There is a health hazard evaluation report by NIOSH with the Costa Mesa Fire Department. Have you seen that before?

A. No.

Q. There is another copy of Madl's.

A. May I see that, please?

(Witness peruses document.)

It is a copy.

Q. There is a copy of the declaration of Dr. Brautbar and apparently his -- oh, no. Yes, and a minuscript of his deposition. Have you read either of those?

A. Both.

Q. And there is a minuscript, a rough version of Fedoruk's deposition. Have you read that?

A. Okay. Is that a minuscript?

Q. It's a rough version. It's not a minuscript. It's a rough version.

A. And is your question have I read that?

Q. Yes.

A. The answer is yes.

Q. Could I see the other materials that you've brought with you?

A. You want me to just give you the whole batch?

Q. Yes. And we'll talk about them. You have here a table of "Tabular Values of 95 Percent Confidence Limit Factors for Estimates of a Poisson-distributed Variable." This is something that -- well, what is this?

A. This is a page from a textbook that I bring with

me to depositions because I have found that it often comes in handy when a question of whether or not something is statistically significant comes up, and it is a shortcut way of getting confidence intervals.

MR. METZGER: Okay. Let's mark that as Exhibit B.

(A copy of the aforementioned document was marked by the court reporter as Plaintiffs' Exhibit+ B for identification; attached hereto.)

BY MR. METZGER:

Q. At this point let me sign this one and give you a check for $1,000 at least so you're not -- I'm not in debt to you as of the present moment.

A. Are we on the record?

Q. I guess we are. I apologize.

A. May we go off the record?

Q. Surely.

(Discussion held off the record.)

MR. METZGER: Back on the record.

Q. There is an article here "Does Diesel Exhaust Cause Human Lung Cancer?" By Tony Cox. Have you seen that before yesterday?

A. Oh, yes. That was mine. I brought that.

Q. That was yours.

A. Yes.

MR. METZGER: Let's mark that as Exhibit C.

(A copy of the aforementioned document was marked by the court reporter as Plaintiffs' Exhibit+ C for identification; attached hereto.)

BY MR. METZGER:

Q. Okay. And you've also brought with you the 9th edition, Volume 2, of Wintrobe's "Clinical Hematology," which we're not going to mark as an exhibit.

A. Good.

Q. Are there any other materials that you have brought with you regarding this case?

A. Yes. I think you didn't finish going through the pile of stuff that I gave you.

Q. I'm sorry. No. I think I did. Oh, there's more here. I apologize. You're right. There is an article by Paolo Vineis. Is that how you pronounce his name?

A. Vineis.

Q. V-i-n-e-i-s. "Tobacco and Cancer: Recent Epidemiological Evidence," JNCI current January 21, 2004. And is this something that you just recently obtained or that Mr. Amundson gave you.

A. No. He did not give it to me. I obtained it myself about -- actually, I think it was faxed to me by another attorney perhaps two weeks ago or so.

Q. It says Brown, McCarrol. Who are they?

A. That's a law firm in Texas.
Q. Have you done work with them before?
A. I've done work with them over the years, yes.
Q. And did you ask them if they had anything regarding that might be helpful for this case?
A. No.
Q. How did it come to you?
A. The attorney who sent it is a Mr. George Butts, and I have worked with him on a number of benzene and leukemia cases, and he sent it because he considered it relevant to that issue.
Q. Unsolicited?
A. Correct. Well, I don't know if solicited or unsolicited is correct. He had sent me an e-mail asking me if I had seen the paper, and, if not, if I would like him to send it to me, and I answered no and yes to those two questions.
MR. METZGER: We'll mark that paper as Exhibit D.
(A copy of the aforementioned document was marked by the court reporter as Plaintiffs' Exhibit+ D for identification; attached hereto.)
BY MR. METZGER:
Q. And then there is a yellow sheet on top of it. It says "NTPB Particulates and IARC 2A Limited in Humans,"

and that's referring to the classification of diesel exhaust as a carcinogen. Is that correct?

A. I would say not as a carcinogen, but it refers to the classification assigned by those two agencies.

Q. Regarding diesel exhaust carcinogenicity?

A. Yeah, that's okay.

Q. Sure. Okay. Let me just ask you: Do you consider diesel exhaust to be a human carcinogen?

A. No.

Q. Okay. Do you consider benzene to be a human carcinogen?

A. I consider it to be a human leukemogen.

Q. Fair enough. And then there is also a letter from Paul Lee with some notes, handwritten notes, and a pathology report for Mr. Workman. Have you reviewed this?

A. Yes.

MR. METZGER: We'll mark that as Exhibit E.

(A copy of the aforementioned document was marked by the court reporter as Plaintiffs' Exhibit+ E for identification; attached hereto.)

BY MR. METZGER:

Q. Are there any other materials that you've been provided by counsel for this case?

A. Yes.

Q. What are they?

A. They are a number of medical records and several depositions including the deposition of Mrs. Workman. Those are the only two categories of information that I recall.

Q. Are you relying on any of those records for any of your opinions in this case?

A. I rely upon the medical records. I rely to some degree on the deposition of Mrs. Workman.

Q. Other than the diagnosis of MDS and the other hematologic conditions reported in the medical records, are you relying on the medical records for anything else?

MR. AMUNDSON: Let me just object that the brief statement of diagnosis of MDS and other hematological conditions is vague and ambiguous, misleading, and a misstatement. But go ahead and answer the question.

THE WITNESS: May I ask what your last word was?

MR. AMUNDSON: And a misstatement.

THE WITNESS: And a misstatement. Okay. May I ask to have the question read back?

BY MR. METZGER:

Q. Let me ask it this way: What are you relying on the medical records for?

A. I rely upon the medical records primarily for two things: One is the virtual certainty that Mr. Workman had one of the myelodysplastic syndromes, the one usually

referred to as RARS. And I rely upon it, on them, in a way which is a little difficult because it's the absence of something. But I rely upon them for the failure of the documentation of the existence of AML.

Q. So you've reviewed the medical records you were provided. Correct?

A. Yes.

Q. And from your review of the records, Mr. Workman never received a diagnosis of AML. Correct?

A. I could not -- although I found allusions to that diagnosis and reference to it, I never found the documentation of it.

Q. Well, do you have an opinion as to whether Mr. Workman had AML?

A. The only opinion I have is that I have not seen any documentation of that diagnosis.

Q. I'm asking you if you personally -- since you are a medical doctor, I'm asking you if you personally have an opinion whether he had AML or whether he did not have AML.

MR. AMUNDSON: Within reasonable medical probability?

MR. METZGER: Sure. He is a medical doctor.

Q. I'm asking you whether you have an opinion, not what your opinion is.

A. I believe I've answered this question.

Q. I don't know that you have.

MR. AMUNDSON: Go ahead and answer it again.

THE WITNESS: Let me answer it again. And if the answer is not satisfactory, maybe we can work on it.

BY MR. METZGER:

Q. Let me interrupt you because I heard your answer. What you said was you had an opinion that certain things were referenced. I'm not asking you what's referenced in the records. I'm asking you whether you have an opinion as to whether Mr. Workman had AML.

A. Yes.

Q. What is your opinion?

A. No.

Q. Upon what do you base your opinion that Mr. Workman did not have AML?

A. I would base it on two things -- three things. First, I reviewed a very large amount of medical records, and I found no documentation of this condition; and I feel it is likely that if he were to have had this condition, it would have been documented in those records. That's No. 1.

No. 2, he had a condition known as RARS, which very infrequently converts to a blast crisis, and there is no evidence that that conversion occurred in this case. Furthermore, I think that the use of the language AML to

describe the blast crisis of MDS is a shorthand commonly used in the medical profession because the blast crisis has the morphologic appearance of AML, but I am not persuaded that the blast crisis of MDS is, in fact, AML.

The third reason, Dr. -- is it Upadhyaya.

MR. AMUNDSON: Upadhyaya I believe is how she pronounces it.

THE WITNESS: This is a lady who gave a deposition in this case.

-- commented, and I believe she was a treating physician for Mr. Workman and was familiar with the circumstances, his circumstances close to even if not right at the end of his life. And she mentions that there was no blast crisis and that, in her opinion, there was not a so-called conversion to AML. So those are the three reasons why I think that Mr. Workman did not have AML.

BY MR. METZGER:

Q. Okay. Now, have you ever diagnosed AML in a patient?

A. No.

Q. Have you ever diagnosed MDS in a patient?

A. No.

Q. Have you ever treated any patients with hematologic conditions?

A. Yes.

Q. How long ago?

A. Well, I think the best way to answer it is from about 1968 to about 1975.

Q. How many patients did you treat with hematologic conditions?

A. And by "hematologic" may I understand the LHCs?

Q. Not limited to cancers including blood dyscrasias.

A. Well, anything that I treated would have been a malignancy.

Q. Okay.

A. But I just wanted to know if I could include the lymphatic series.

Q. Sure.

A. And the question was how many?

Q. Yes.

A. Something in the vicinity of 50 or 60. I want to say I was not the sole provider of their care.

Q. Are you an oncologist?

A. No. Not insofar as that term is used to refer to the practice of clinical oncology.

Q. Are you a hematologist?

A. No.

Q. What was the context in which you treated these 50 to 60 patients?

A. I was a fellow in the hematology and oncology clinics of the Massachusetts General Hospital over this period of time.

Q. And how many patients -- well, during that time period, did myelodysplastic syndrome exist as a disease entity?

A. I'm not sure it exists as a clearly defined disease entity even today, but the answer to your question is that the word "myelodysplastic syndromes" was in use. However, the classification and terminology was not well developed at that time.

Q. Did you ever make a diagnosis of myelodysplastic syndrome in any patient during that period?

A. Perhaps I could save us some time by mentioning that this was a treatment clinic and that the patients who were seen at that clinic had been diagnosed before coming there.

Q. I'm asking --

A. No. I never actually made, myself, the diagnosis of any of the myelodysplastic syndromes or any of the lymphatic hematopoietic cancers.

Q. Including AML?

A. Including AML.

Q. Okay. Now, what is the percentage of blasts -- strike that. Are you familiar with the different

classification systems for MDS?

A. When you say the different systems, do you mean, in fact, the different systems or the different categories of MDS?

Q. No. I'm talking about the different classification systems; World Health Organization, FAB, those types of systems.

A. I'm only familiar with the FAB.

Q. And under the FAB, what is the percentage of blasts that is required for an MDS to be deemed to have converted to an AML?

A. I don't know the answer to that.

Q. And you are not familiar with that classification under the World Health Organization?

A. That is correct.

Q. Okay. Would you define blast crisis, please, as you use it.

A. No, I can't define it. I use it when a physician who is involved in the care of a patient says that such a phenomenon has occurred.

Q. Is it your belief that there is a blast crisis of MDS?

A. Certainly there can be in some cases, yes.

Q. Do you have any source to support that?

A. I want to be sure I understand the question. Do

I have a source to support my representation that something described as a blast crisis can occur --

Q. In MDS?

A. -- as part of the natural history of some cases of MDS?

Q. Yes.

A. Yes.

Q. What's that source?

A. It's here in this book (indicating).

Q. Wintrobe?

A. Yes.

Q. All right. Now, have you ever made a study of the epidemiologic studies concerning alkylating agent therapy and secondary MDS?

A. I will need a little clarification here. When you say have I ever made a study of this phenomenon, do you mean have I done any of the original data generating research on it?

Q. We can start with that. I am familiar with your background. I assume the answer is no. Is that correct?

A. That is correct.

Q. Have you ever made a literature search for the epidemiologic studies concerning alkylating agent therapy and the development of MDS?

A. I have never done a literature search that was

specifically oriented to that question.

Q. And have you ever evaluated causality for alkylating agent therapy and MDS?

MR. AMUNDSON: Objection; the term "causality" is a legal term. If you want to answer within the field of epidemiology, go ahead, Doctor.

THE WITNESS: I'd like to have the question read back.

MR. METZGER: Sure. Please read it back.

(Question read.)

THE WITNESS: Only in the context that I have attempted to maintain a familiarity with the causes of the disease. I have not done anything specifically to explore that particular possible relationship.

BY MR. METZGER:

Q. Okay. Have you ever done any literature search to ascertain the available epidemiologic literature concerning alkylating agent therapy and secondary AML?

A. I need some clarification of this expression which you have used several times and perhaps will use again, and that is have I made a literature search of. And I'd like to understand whether or not you mean that I have specifically through one means or another attempted in some systematic way to identify the literature that pertained or that might pertain to that specific issue.

Q. That's exactly what I mean.

A. The answer is no.

Q. And without having done that, have you ever made an assessment of causality for alkylating agent therapy and secondary AML?

MR. AMUNDSON: Objection; calls for a legal conclusion. If you can answer from an epidemiological standpoint, go ahead.

THE WITNESS: Again, I'd like to ask for the question to be read back.

(Question read.)

THE WITNESS: Yes.

BY MR. METZGER:

Q. How did you do that?

A. Well, first I'd like to say not only did I do it, but I published it. And has my CV come?

Q. Yes. Let's mark your CV as Exhibit F.

(A copy of the aforementioned document was marked by the court reporter as Plaintiffs' Exhibit+ F for identification; attached hereto.)

MR. METZGER: And your case list we'll mark as Exhibit G.

(A copy of the aforementioned document was marked by the court reporter as Plaintiff's Exhibit+ G for identification; attached hereto.)

THE WITNESS: Allow me just a minute.

BY MR. METZGER:

Q. Sure.

A. May I respond now?

Q. Certainly.

A. My publication No. 182 is a book chapter which lists the causes of the various forms of cancer, and it describes alkylating agents as a cause of acute myelogenous leukemia. That book chapter is now about almost four years old.

Q. Okay. And when you wrote that book chapter, how did you determine that alkylating agent therapy causes AML?

A. There are two ways that I determine it. But the way that I determined it for this particular book chapter is that that book chapter is a recapitulation of the IARC Group 1 agents. If there were a cause-effect relationship according to IARC that I disagreed with, then I would have noted that in that chapter, not necessarily by saying I disagree but, rather, that the nature of the evidence was less than persuasive or something along those lines.

Q. Is benzene an alkylating agent?

A. No.

Q. Does it have any alkylating properties?

A. I don't know.

Q. Is benzene a topoisomerase 2 inhibitor?
A. I don't know.
Q. Are you familiar with a condition known as the 5q- syndrome?
A. Well, I call it the 5q deletion syndrome. But when you say am I familiar with it, I am aware of its existence.
Q. How did you become aware of its existence?
A. I don't know. I've been aware of it for quite a while.
Q. And what is that condition?
A. I can't describe it.
Q. Have you made a systematic search of the literature to ascertain epidemiologic studies concerning that condition?
A. No.
Q. Have you ever attempted to investigate the causes of that condition?
A. No.
Q. Are you familiar with a condition known as monosomy 7?
A. Yes.
Q. And could you define that for us?
A. It's the absence of one of the No. 7 chromosomes.
Q. How did you become familiar with that condition?

A. I really don't know how to answer that other than to say I have been aware of the existence of that condition for many years.

Q. Have you ever conducted a systematic search of the literature to ascertain epidemiologic studies which bear upon that condition?

A. Well, the answer to your question is no. But I just want to state, because this question about systematic searches of the literature has come up several times, that this is not the way in which I do my work. It would be a rare thing for me to go to the computer and do what I think you mean by a systematic review of the literature. In fact, I would never do it. I have a person who would do it for me. I conduct my work by finding the most recent paper and then going back from that. And then when I get to the point where I'm starting to get -- paths are starting to cross, I will usually stop. I'll stop at that point.

Q. Well, then, let me ask you: Have you ever done that process that you just described for the 5q- syndrome?

A. No.

Q. Have you ever done that process for the monosomy 7?

A. No.

Q. Other than the papers which we've identified here

today and which are referenced in your article in "Leukemia Research" regarding myelodysplastic syndromes, can you identify for me any other articles which assess the epidemiology of myelodysplastic syndromes?

A. I think I have mentioned the papers by Hayes and Yin. I don't know if that was included in your question.

Q. Yes.

A. The answer is no, I cannot, from my memory.

Q. And can you identify for me any articles which assess the epidemiology of the 5q- syndrome?

A. No.

Q. Or monosomy 7?

A. No.

Q. Or the 5q- syndrome in MDS?

A. No.

Q. Or the monosomy 7 in MDS?

A. No.

Q. Have you ever studied the benzene leukemia literature to ascertain the frequency that a benzene-induced AML is preceded by a myelodysplastic process?

MR. AMUNDSON: Can I hear that question again.

(Question read.)

THE WITNESS: Could I ask you to read it one more time a little bit more slowly.

(Question reread.)

THE WITNESS: May I ask a question of clarification?

BY MR. METZGER:

Q. Certainly.

A. I believe the question uses the term a benzene-induced case of AML.

Q. Yes.

A. Is that correct?

Q. That's correct.

A. I don't know of any way of knowing that any particular case of AML is, in fact, benzene induced. And so I don't know how I can respond to the question if the context of the question is with regard to one or more individually identified human beings with the disease AML.

Q. All right. Well, let's try it this way, then. Have you ever reviewed the epidemiologic literature of benzene exposed -- strike that. Have you ever reviewed the epidemiologic literature pertinent to benzene exposure and the development of AML to determine the frequency of a precedent myelodysplasia?

MR. AMUNDSON: Objection; vague.

THE WITNESS: I need to be very sure I understand the question. Have I ever looked at the literature which is or attempts to be descriptive of the frequency with

which the diagnosis of AML is known or thought to have been preceded by a set of findings that could be described as one of the MDS's? And I assume that we are excluding here from the category of cases of AML those conditions which arise as a blast crisis in a known case of MDS.

BY MR. METZGER:

Q. No. That's not my question at all. Off the record.

(Discussion held off the record.)

(Lunch recess was at 12:17 p.m.)

* * *

MONDAY, FEBRUARY 9, 2004, LONG BEACH, CALIFORNIA

AFTERNOON SESSION

1:13 P.M.

* * *

(The question read as follows:

"Q. All right. Well, let's try it this way, then. Have you ever reviewed the epidemiologic literature of benzene exposed -- strike that. Have you ever reviewed the epidemiologic literature pertinent to benzene exposure and the development of AML to determine the frequency of a precedent myelodysplasia?")

THE WITNESS: No.

CONTINUED EXAMINATION +

BY MR. METZGER:

Q. Do you have an opinion as to the frequency of precedent myelodysplasia?

A. No.

Q. Do you know what caused Mr. Workman's MDS?

A. No.

Q. I think this question is probably the same, but I'm going to ask it just to be thorough. Do you have an opinion as to what caused Mr. Workman's MDS?

A. Well, truthfully, I don't see a distinction between them, but the answer is no.

Q. For purposes of this next question I'd like you to assume that Mr. Workman had AML. The question is: Assuming that to be true, do you have an opinion as to what caused Mr. Workman's AML?

MR. AMUNDSON: Okay. The question is vague and ambiguous, compound, and an incomplete hypothetical. You're asking him to opine as to the cause of a hypothetical medical condition.

MR. METZGER: No, not at all. AML is not a hypothetical medical condition. I'm asking him my question. Your objections are noted for the record.

MR. AMUNDSON: Okay.

THE WITNESS: I'll need clarification of an issue. When you say I shall assume that he had AML, I want to be clear that I understand whether or not you mean that he had a blast crisis in MDS that is often referred to as AML, or, in fact, he developed the condition which would be the same as the usual de novo AML, which usually is not preceded by a diagnosable -- no. Which is usually not preceded by a diagnosed MDS.

MR. AMUNDSON: Why don't you reread the question.

BY MR. METZGER:

Q. Let me approach it this way. You've made

reference to certain references in Mr. Workman's medical records of a diagnosis of AML. I'm asking you to assume that those references are true and that Mr. Workman did, in fact, have AML.

A. Okay.

Q. Do you have an opinion as to the cause of his AML?

MR. AMUNDSON: How can he answer that, Counsel? You've given him a hypothetical situation.

MR. METZGER: Just make your objections for the record.

+MR. AMUNDSON: Well, if you don't want to clarify it, then I'll object that it's an incomplete hypothetical, it's vague and ambiguous, and instruct him not to answer.

MR. METZGER: You're not going to instruct him not to answer.

MR. AMUNDSON: I just did.

MR. METZGER: I'll seek to exclude his testimony.

Q. Will you answer the question, Dr. Cole?

MR. AMUNDSON: If you think you understand what he's asking, go ahead and respond to it.

THE WITNESS: I cannot respond to this question yet because it has a premise, at least as I understood the question -- it does go by a little fast -- that the record

or the records refer to this man as having a documented case of AML.

Now, I may have misunderstood the question, but I think that my recollection is that that is what you said. I have never seen in the medical records a documentation of the existence of AML in the case of Mr. Workman.

BY MR. METZGER:

Q. All right. Then let me approach it this way. I'd like you to assume that Mr. Workman had AML, whether that was a de novo or a progression of a preexisting myelodysplastic syndrome. And I would like to know whether you have an opinion as to the cause of the AML.

MR. AMUNDSON: Objection; vague and ambiguous, compound, unintelligible, and an incomplete hypothetical, calls for the witness to speculate.

THE WITNESS: The answer is no.

BY MR. METZGER:

Q. Okay. Among the general topics that you've told me you had opinions on was whether Mr. Workman's condition was caused by exposure to benzene. What is your opinion on that topic?

A. The answer is that there is no evidence that it was caused by benzene.

Q. On what do you base that conclusion?

A. The first is that benzene exposure is not a

generally accepted cause of MDS. The second is that from what I would understand of his exposures to benzene in this particular case, they would not be adequate to increase his risk of any particular condition. Those are the two reasons or the two bases for my statement.

Q. Do you have an opinion as to Mr. Workman's cumulative received dose of benzene?

A. Yes, I do.

Q. What was it?

A. My opinion is that his exposure to benzene would be minimal and far below that which is generally considered to be the first doubling dose for the condition known as AML.

Q. Are you able to quantify Mr. Workman's received dose of benzene?

A. I can semi-quantify it.

Q. Well, give me your best quantification that you can.

A. Okay. Minimal.

Q. I would say that's qualitative rather than quantitative. Are you able to give me a quantitative range or estimate of his cumulative benzene exposure?

A. It is far below that which is the first doubling dose for AML.

Q. And what do you consider to be the first doubling

dose for AML?

A. 100 ppm years.

Q. Are you aware of any study which has validated part per million years as the most sensitive indicator of benzene-induced leukemia?

A. May I ask what you mean by the statement "the most sensitive indicator of"?

Q. Sure. I'll answer your question with an explanation, and we'll do it this way. There are different metrics which can be used to assess benzene exposure. True?

A. Yes.

Q. And one of those is a cumulative part per million year dose. Correct?

A. Yes.

Q. One can also assess benzene exposure by duration. True?

A. Yes.

Q. And one can also assess benzene exposure by peak exposures. True?

A. Yes, yes.

Q. These are all different metrics of benzene exposure.

A. Yes.

Q. Are you aware of any study which has validated

part per million years as the most accurate or sensitive metric for assessing causality of benzene-induced leukemia?

A. But that's my question. It's not whether or not there are other metrics and what they may be, but what you mean by the most sensitive or accurate.

Q. Okay. What I mean is the one that most -- that best conforms to epidemiology.

MR. AMUNDSON: Does that make sense to you?

THE WITNESS: I think it will in another minute or two.

MR. AMUNDSON: Okay.

BY MR. METZGER:

Q. Let me approach it this way, Dr. Cole. Maybe this will help. Are you aware of any epidemiologic studies which have evaluated odds ratios for risk of leukemia in benzene-exposed workers in which the studies compare different metrics?

A. There are several such studies as that.

Q. And can you name any?

A. I can't name any offhand. But I don't know how one would know from any small number of such studies that the metric -- how to decide which metric is the most accurate predictor of risk enhancement. There has been a tendency to use the metric that gives the highest odds

ratios or SMRs. I think this is fundamentally fallacious. Generally speaking -- no. I want to retract the words "generally speaking."

It is considered to be true for all known human carcinogens that some measure of cumulative exposure, whether it's ppm years or some other way of combining intensity and duration, is the most accurate descriptor of risk with the exception -- no. I'll end my response by saying this: With one exception and one possible qualification.

Q. What are you referring to?

A. By the exception?

Q. Yes.

A. I am referring to the circumstance that the risk of leukemia subsequent to radiation, ionizing radiation exposure, in some circumstances may reach a plateau and not be a strict monotonic function of exposure. That's one. And the qualification is that -- I hope I said possible qualification. I should have said possible qualification -- many epidemiologists and toxicologists are of the point of view that it may turn out to be true that there is an intensity below which the exposure should not contribute to the measure of ppm years for -- well, possibly in general.

Q. Are you aware of any study that has proved a

threshold for benzene?

A. First I have to ask if you could use some other word other than "proved" because I hold proof at least in scientific circles to be a virtually unattainable standard.

Q. Well, using the word "proved" as you've just indicated, are you aware of any study that has proved that there is a threshold exposure to benzene below which leukemia cannot occur?

MR. AMUNDSON: Objection; the question is vague and ambiguous, argumentative as worded, as in the use of the word "proved." That's it.

THE WITNESS: I should answer?

BY MR. METZGER:

Q. Please.

MR. AMUNDSON: If you can.

THE WITNESS: I understood the question to end with the expression "below which benzene does not occur." I'm sorry. "Below which leukemia does not occur."

BY MR. METZGER:

Q. Cannot occur.

A. Cannot occur. May I ask if the question could be qualified to below which an increase in the risk of "benzene" cannot occur?

Q. No. I'd like you to answer the question that I

asked you.

A. No.

Q. That is your answer?

A. Yes. My answer is no.

Q. Now, isn't it true that what is known of the mechanisms by which benzene causes leukemia is inconsistent with the parts per million year metric?

MR. AMUNDSON: Objection; vague and ambiguous.

THE WITNESS: My answer is I don't know.

BY MR. METZGER:

Q. Okay. Have you researched the literature to ascertain the dose of benzene that is necessary to cause the 5q- syndrome?

A. No.

Q. Have you researched the literature to ascertain the dose of benzene which is necessary to cause the monosomy 7?

A. No.

Q. Are you familiar with any articles by Aksoy regarding benzene and myelodysplastic syndrome?

A. Yes.

Q. Which ones?

A. Well, I don't remember which ones now, but I am aware that there was one.

Q. And what was the finding of that study?

A. I don't recall.

Q. Are you familiar with any studies by Aul, A-u-l, regarding benzene and myelodysplastic syndrome?

A. Yes.

Q. Which one?

A. I don't recall.

Q. What was the finding of that study?

A. I don't recall.

Q. Are you familiar with any studies by Baslo, B-a-s-l-o, regarding benzene and myelodysplastic syndrome?

A. No, I am not.

Q. Are you familiar with any studies by Brandt, B-r-a-n-d-t, regarding benzene exposure and myelodysplastic syndrome?

A. No, I am not.

Q. Are you familiar with a study by Chen entitled "Benzene-Induced Myelodysplastic Syndrome"?

A. Yes.

Q. And what is the finding of that study?

A. I believe there was a representation on the part of the authors that there was an increased risk of myelodysplastic syndrome among people who they categorized as occupationally exposed to benzene.

Q. And do you recall whether that finding was significant?

MR. AMUNDSON: Objection; vague as to the term "significant."

THE WITNESS: I was about to ask you: Did you mean statistically significant?

BY MR. METZGER:

Q. Yes. I make it a practice of whenever using the word significant to refer to statistical significance, and when I'm not talking about that, I use the word "important."

A. Okay. I'm glad to know that. So I can assume that to be true?

Q. Yes. I'm talking about statistically significant.

A. I don't recall whether it was statistically significant or not.

Q. Are you familiar with a study by Ciccone, C-i-c-c-o-n-e, regarding benzene exposure and myelodysplastic syndrome?

A. No.

Q. Are you familiar with a study by Cowles, C-o-w-l-e-s, regarding benzene exposure and myelodysplastic syndrome?

A. Yeah. I think that's -- I think her name is pronounced Cowles. And that is Sally Cowles or S. Cowles. Correct?

Q. Yes.
A. Yes, I am.
Q. And what was the finding of that study?
A. I don't recall the finding.
Q. Are you familiar with a study by Crane regarding benzene exposure and myelodysplastic syndrome?
A. No.
Q. Are you familiar with a study by Cuneo on that topic?
A. Could you spell that.
Q. C-u-n-e-o.
A. Yes.
Q. What was the finding of that study?
A. I don't recall the finding.
Q. Are you familiar with a study by Farquhar, F-a-r-q-u-h-a-r, regarding benzene and MDS?
A. No.
Q. Are you familiar with a study by Farrow regarding benzene and MDS?
A. No.
Q. Are you familiar with study by Fengtong on that topic?
A. No.
Q. Are you familiar with a study by Goguel, G-o-g-u-e-l, on that topic?

A. Could you read me the title of that paper.

Q. Sure. "Les Leucemies Benzeniques de la Region Parisienne entre 1950 et 1965."

A. Yeah. I am familiar with that paper. My recollection is that it is a study of the epidemiology of leukemia. I don't recall anything in it about MDS.

Q. Incidentally, was MDS previously referred to as preleukemia?

A. It's possible that some people made that equivalence of terminology. It was never a standard or accepted terminology.

Q. Well, before myelodysplastic syndrome was called that, what was it called by clinicians?

A. Dismyelopoiesis.

Q. And have you read any articles where it had been previously referred to as preleukemia?

A. I have certainly read literature on the condition known as preleukemia. I have never seen an epidemiologic study of it. Whether or not some individual cases of what was to come to be known as MDS were labeled preleukemia or not, I don't know. But I do not understand the word preleukemia as it was ordinarily used to be the equivalent of what we now call any of the MDS's.

Q. Are you familiar with a study by Goldberg regarding benzene and MDS?

A. Again, could I ask for the title of that?

Q. "Survey of Exposure to Genotoxic Agents in Primary Myelodysplastic Syndrome."

A. No.

Q. Are you familiar with a study by the Groupe Francais regarding benzene and myelodysplastic syndrome?

A. No.

Q. Are you familiar with a study by Hasselbalch regarding benzene and MDS?

A. No.

Q. You mentioned this study by Hayes. Which study by Hayes are you referring to?

A. I'm not sure how to identify it to you. I'd have to see it. As far as I know, there was only one in which myelodysplastic syndrome or similar language was incorporated into the title.

Q. Okay. Are you familiar with a study by Hotz, H-o-t-z, regarding benzene and MDS?

A. No.

Q. Are you familiar with a study by Ido, I-d-o, regarding the epidemiology of MDS?

A. No.

Q. Are you familiar with a study by Iurlo, I-u-r-l-o, regarding MDS?

A. No.

Q. Are you familiar with a study by Jacobs concerning MDS?

A. No.

Q. Are you familiar with a study by Kim concerning benzene and MDS?

A. No.

Q. Are you familiar with an article by Levine entitled "Secondary Myelodysplastic Syndromes and Leukaemias"?

A. No.

Q. Are you familiar with a study by Levine entitled "Leukemias and Myelodysplastic Syndromes Secondary to Drug, Radiation, and Environmental Exposures"?

A. No.

Q. Are you familiar with a study by Mecucci regarding benzene and MDS?

A. No.

Q. Are you familiar with a study by Mele, M-e-l-e, regarding leukemia and preleukemia?

A. Yes.

Q. What is that study?

A. I have read the paper, but I don't recall it.

Q. Are you familiar with a study by Mironova regarding --

A. The answer is no.

Q. Are you familiar with a study by Nagata?
A. No.
Q. Are you familiar with a study by Nisse, N-i-s-s-e?
A. No.
Q. Are you familiar with a study by Preudhomme regarding MDS?
A. No.
Q. Are you familiar with a study by Rigolin regarding MDS?
A. No.
Q. Are you familiar with a study by Rodella regarding MDS?
A. No.
Q. Are you familiar with a study by Rozman concerning MDS?
A. The first name?
Q. R-o-z-m-a-n.
A. No.
Q. Are you familiar with a study by Ruiz, R-u-i-z, regarding benzene and MDS?
A. No.
Q. Are you familiar with a study by Sandler regarding MDS?
A. Yes.

Q. Which study?

A. I think I have it here.

MR. AMUNDSON: You've identified it already.

MR. METZGER: Oh, we have.

Q. And are you familiar with any other studies by Sandler concerning MDS?

A. No.

Q. Are you familiar with a study by Sanz, S-a-n-z, regarding MDS?

A. No.

Q. Are you familiar with a study by Shen, S-h-e-n, regarding MDS?

A. No.

Q. Are you familiar with a study by Smith regarding benzene exposure and risk of MDS?

A. No.

Q. Are you familiar with a study by Snyder entitled "Benzene and Leukemia" which concerns MDS?

A. No.

Q. Are you familiar with a study by Stafford concerning MDS?

A. No.

Q. Are you familiar with a study by Stillman concerning MDS?

A. No.

Q. Are you familiar with a study by Tasaka regarding MDS?

A. Could you read the title of that.

Q. Sure. "Translocation 3;21, et cetera, Found in a Patient with Myelodysplastic Syndrome and Long-term Exposure to Organic Solvents."

A. Yeah. I have read that paper.

Q. And what is the finding of that paper?

A. I think it's essentially captured in the title. It's an individual case report. It's not an epidemiologic study.

Q. Are you familiar with a study by Travis concerning benzene and MDS?

A. Again could you read the title.

Q. "Hematopoietic Malignancies and Related Disorders Among Benzene-exposed Workers in China."

A. Yes.

Q. What is the finding of that study?

A. I don't recall.

Q. Are you familiar with a study by Tsai, T-s-a-i, regarding benzene and MDS?

A. May I ask if the author's first initial is S?

Q. Yes, it is.

A. Yes, I am familiar with that paper.

Q. What's the finding of that study?

A. I don't recall.

Q. Are you familiar with a study by Van den Berghe regarding MDS?

A. No.

Q. Are you familiar with a study by Vineis regarding MDS?

A. Could you read me the title of that paper. I think it might be here.

MR. AMUNDSON: I think we identified that.

THE WITNESS: No. That was the paper that I brought. Maybe read me the title.

BY MR. METZGER:

Q. Yes, I will. "Cytogenetics and Occupational Exposure to Solvents: A Pilot Study on Leukemias and Myelodysplastic Disorders."

A. I am familiar with that paper.

Q. What is the finding?

A. I don't recall the finding.

Q. Are you familiar with a study by Vineis entitled "Solvent Exposure and Myelodysplastic Syndrome"?

A. Well, now that you read them in immediate juxtaposition, I can't say which one I am familiar with. I am not familiar with two.

Q. Are you familiar with any studies by West regarding benzene and MDS?

A. No.

Q. Are you familiar with any studies by -- I think you did mention a study by Y-i-n.

A. Yin, Y-i-n.

Q. You did?

A. Yes. I just want to be clear that it's Yin, not Yen. I think you said Yen.

Q. It is Yin, Y-i-n.

A. Okay.

Q. How many studies by Yin are you familiar with regarding benzene and MDS?

A. Just one.

Q. And what is the finding of that study?

A. It represents that among the group of people described as benzene workers that there was an excess of MDS.

Q. Was the excess statistically significant?

A. I don't recall.

Q. Do you recall how many cases of MDS there were in this study?

A. No.

Q. Are you familiar with a study by Zapata Gayon?

A. No.

Q. Are you familiar with any studies that have found a statistically significant excess of AML in truck

drivers?

A. I believe there is -- well, I don't know if it's statistically significant, so I guess I'll have to answer the question in the negative.

Q. Are you aware of any studies finding a statistically significant excess of AML in workers exposed to diesel exhaust?

A. No.

Q. Are you familiar with any studies finding a statistically significant excess of MDS in truck drivers?

A. No.

Q. Are you familiar with any studies finding a statistically significant excess of MDS in diesel exhaust exposed workers?

A. No.

Q. Are you familiar with any studies finding a statistically significant excess of MDS among smokers?

A. No.

Q. Incidentally, we've been referring to the term "statistically significant," and we haven't actually defined that. But in answering my questions have you assumed that I've meant statistically significant to a 95 percent confidence interval?

A. I have understood that.

Q. Yes. And would you agree that that is the

convention for statistical significance, although it is -- well, that much?

A. Mr. Metzger, I'm not sure if you're going someplace with this or not, so I just want to say that it is not statistically significant to the 95 percent confidence interval. It is statistically significant at the 5 percent level of probability. I just don't know if we're going down that road or not.

Q. Yes. I misstated it. Being a lawyer rather than an epidemiologist, I tend to lapse.

A. It really doesn't matter if that's the end of the story. It does matter if we go down to what's the meaning of confidence interval relative to the meaning of P values.

Q. That's a venture I don't want to embark on right now.

A. Neither do I.

Q. Okay. Are you aware of any mechanistic studies regarding benzene which indicate that as benzene -- as the concentration of benzene increases to about 25 parts per million, there is an increasingly lesser production of toxic metabolites?

A. I am not aware of any such study. Well, let me ask for some clarification. When you say a "lesser production," do you mean in a relative or an absolute

sense?

Q. I mean a relative sense.

A. Okay.

Q. And absolute as a matter of fact.

A. Yeah. My question back was not well phrased. I should have asked whether or not it is relative, and you've answered that.

My answer is that there is one paper that addresses this issue. I don't recall exactly where the cut point was. I think it might have been 20, but perhaps it was two alternatives, one being 20, one being 40. So yes, there is at least one paper that deals with the human situation and the relationship between low level exposures and possible proximate leukemogens or toxins, if you wish.

Q. Do you know what the toxic metabolites of benzene are?

A. I think there are several, but I assume that the one we're interested in is the proximate leukemogen.

Q. Well, let me just ask you: What are the toxic metabolites of benzene?

A. I don't know.

Q. Do you have an opinion as to whether benzene causes AML by inducing genetic damage?

MR. AMUNDSON: I'll object. That question is vague as to the term "genetic damage." Go ahead.

THE WITNESS: Yes. I need to ask for a question of clarification. In your question do you mean benzene per say, or do you mean benzene or one of its metabolites?
BY MR. METZGER:
Q. Benzene and/or one or more of its metabolites.
A. The answer to your question, then, is yes.
Q. I forgot what my question was.
A. I think it related to whether or not benzene or one of its metabolites causes AML by genetic damage.
Q. Okay. Are you able to identify for me the genes which benzene damages in causing AML?
A. No.
Q. Are you able to identify for me the chromosomes which benzene damages in causing AML?
A. No.
Q. You also had an opinion regarding the possible role of smoking in Mr. Workman's condition. And what is your opinion on that topic?
A. I believe that there would be no way to substantiate the point of view that Mr. Workman's cigarette smoking would have produced his case of MDS.
Q. Okay. I think I've gone through the general topics that you provided me earlier. As we've gone through this process, have any additional topics or opinions occurred to you that you have not yet related to

me?

A. No. But I understand that it's possible that I may be asked to read some other depositions, whether of plaintiffs or defense witnesses, and so it is possible that other opinions will come to mind.

There is one area that you did not ask me about, which is important to my point of view. And there is another area that you asked me about but from a perspective that did not allow me to state a fundamental part of the basis for my point of view.

Q. Please tell me.

A. Both?

Q. Both, sure. I'm here to find out your opinions, so whichever you'd like to tell me.

A. The first one is that the probability of conversion during the remaining lifetime of a case of MDS to blast crisis and/or possibly AML if you wish to call it that is known, and it differs among the different types of MDS. And it is the lowest and is, in fact, rather low for refractory anemia with ringed sideroblasts. So I would just state that to be a fact and -- I don't know how to do this. Do I show how I documented, or do I wait to see if you ask me about that?

MR. AMUNDSON: Let him ask that.

MR. METZGER: I will.

Q. But before you do that, you have another matter you want to tell me about. So why don't you tell me about that.

A. The occupational exposure to diesel exhaust and which usually also entails occupational exposure to diesel fuel is something that has been studied in large number of rather large studies with interest in a full array of end points by which I mean all causes of death or at least all major causes. These studies have had a focus on cancer of the lung and to a lesser extent -- well, to a much lesser extent cancer of the bladder. I know of none of these major studies of the adverse effects of high level exposures to diesel exhaust that show an excess of any form of leukemia.

I will mention, incidentally, that they don't show MDS either, but they don't actually present data on that condition. Therefore, a large part of the justification for my point of view that Mr. Workman's exposure to diesel exhaust and/or fuel did not produce his MDS is based not on a reverse view of what is known about the causes of MDS but, rather, on the forward view of what is known about the adverse health effects of diesel exhaust. So those are my two points.

Q. Of the studies that you're referring to regarding diesel exhaust, how many of those studies had sufficient

statistical power to detect a significant increase in AML?

A. Mr. Metzger, this question will need a little work before I can answer it. May I try to suggest how we could improve the question?

Q. Well, let me just ask you if you can tell me the number of those studies --

A. No, I can't.

MR. AMUNDSON: Let him finish the whole question. I think you interrupted him.

THE WITNESS: Sorry.

BY MR. METZGER:

Q. Let me ask another question, and we'll explore a little further. How many of the studies, epidemiologic studies that you are referring to regarding diesel exhaust have sufficient statistical power to detect a significant increase of MDS?

A. Again, I cannot answer the question as phrased.

Q. Okay. How would you like me to change the question? Not that I'm going to, but I'll entertain the suggestion.

A. I think the question would be converted into something I could answer if you change two parts of it. One was that instead of talking about statistical power, you asked the more general question about the precision of the study. I consider and I think most epidemiologists

consider power to be what is termed a front end or planning issue in study design, and its counterpart is precision of the width of the confidence interval at the analytical or interpretative phase.

The second thing is you asked to detect a significant, and I understand you to mean statistically significant, excess if there were in truth to be one. It is not possible to answer that question without stating what level of precision -- I'm sorry -- what level of significance would have been requested.

There is another point, and that is that when you ask a question of this sort -- I'll reverse that. When I would try to answer a question of this sort, and when it is phrased in the context of an array of studies, the question of the precision and statistical significance of any one individual study becomes a relatively minor issue. The issue becomes whether or not an array of studies which are in at least some sense comparable in terms of the cause-effect relationship that they seek are displaying similar or dissimilar results.

Q. Have you conducted any meta-analyses of these studies?

A. No.

Q. What is the frequency that you believe exists for the conversion of RARS to AML?

A. With the understanding that I will accept your language of conversion of AML to be the equivalent to my language of blast crisis, the answer is 5 percent.

Q. Now, of that 5 percent, what percentage of those are --

A. I'm sorry. I need to ask if we could go back to that question. Could I have it read back because I might have missed an important part. I might have assumed something in my answer that you didn't actually say.

Q. Why don't you just clarify.

A. I was speaking about the conversion to blast crisis or AML, if you will, wish, in that form of MDS that Mr. Workman had.

Q. Which is RARS?

A. Yes. Is that what you asked?

Q. I said specifically RARS.

A. I lost that.

Q. That's fine. Now, my next question is: Regarding that approximately 5 percent that you mentioned -- first of all, what is the source of your information for that? Is that Wintrobe?

A. Yes.

Q. And of that approximately 5 percent, what percentage of those were cases of patients who had been administered alkylating agents?

A. I don't know.

Q. Are you aware of the frequency or percentage of conversion of RARS to blast crisis or AML for patients who have RARS as a result of alkylating agent therapy?

MR. AMUNDSON: Objection; compound, vague and ambiguous, overbroad. If you understand it, go ahead and answer it.

THE WITNESS: My answer is no.

BY MR. METZGER:

Q. Okay. Let me just review. I think we're done.

MR. AMUNDSON: Give me two minutes.

BY MR. METZGER:

Q. What I'd like to do is we're all going to take a short break for various reasons. And during that break I would like you to think, Dr. Cole, if you've told me now all of the opinions that you have in this case, and we'll come back in a short minute and find out if there's anything left.

A. So when we resume, you would like me to tell you whether or not I feel that I have been asked about all of my opinions?

Q. Whether you've related them to me, whether I've asked you about them or not.

A. Well, if you've asked them, I've related them.

(A recess was taken.)

BY MR. METZGER:

Q. Dr. Cole, I have asked you before the break if you would think during the break if there are any other opinions that you have that you have not yet related to me.

A. No.

Q. Okay. I have a few more questions for you, and we'll be done shortly. You have told me that -- I'm not sure I'm stating this accurately, but that it's your opinion that benzene does not cause MDS. First of all, am I right on that, that that's your opinion?

A. No. It would have depended on the context how I would have phrased it. But since you ask it pointedly, then I have to say no.

Q. Well, what is your opinion on that topic?

A. My opinion is that the available scientific evidence does not support a causal relationship between benzene and MDS, but I used the expression for shorthand that you originally said.

Q. Fine. Now, when you are referring to the available evidence, what types of evidence or data are you referring to?

A. Now, when you say when I refer to the available evidence, you mean as in the statement that I made just prior to this question when I said the available

scientific evidence?

Q. Yes.

A. I refer to the totality of it but, of course, with my primary emphasis being on the epidemiology.

Q. Okay. So at least part of it is epidemiology?

A. No. It's not part of it. It's the overwhelming majority of it, and it is in the tradition of the original rules of the IARC for putting the substance into Category 1.

Q. Other than epidemiology, what types of studies are you relying on for your opinion on that point?

A. And when you say "on that point," you mean --

Q. Benzene causing --

A. -- benzene as a cause of MDS?

Q. Yes.

A. I also rely upon my understanding of the animal studies.

Q. Anything else?

A. No.

Q. Okay. What animal studies are there that you have reviewed regarding benzene and MDS?

A. I haven't reviewed any.

Q. What animal studies regarding benzene and MDS have you considered in forming your opinion?

A. It is not that I have considered any particular

study or studies, but it is my understanding that the available animal evidence does not establish benzene as a cause of MDS in animals.

Q. And what is your -- upon what are you basing that?

A. Well, I can't give you a citation. That's just my recollection at this time.

Q. Have you ever attempted to ascertain what animal studies there are that report morphological features which are those of MDS?

A. No, I haven't attempted to do that.

Q. Now, you mentioned IARC. Has IARC ever published a monograph regarding benzene and MDS?

A. You mean a monograph that was specifically given over to that question?

Q. Well, let me rephrase. IARC publishes monographs regarding the carcinogenicity of chemicals. True?

A. Yes.

Q. And the last IARC assessment of benzene was what? 1989? Is that right?

A. I really don't recall. For the purpose of this case, I didn't check benzene. I checked diesel exhaust.

Q. In any of the IARC evaluations of the carcinogenicity of chemicals, does IARC look at MDS as a carcinogenic end point?

A. No. I would assume not. Let me just be clear. You asked me whether or not I considered benzene to be a cause of MDS, and I said that if I were to use the criteria that were the old criteria of IARC, basically what I was trying to say there was that the available evidence in human beings is sufficient, then the answer would be no.

Q. And what specific criteria are you referring to?

A. Let me be sure I understand the question. You mean what are the IARC's criteria?

Q. I can read the IARC criteria, and I have. You've already told me that IARC does not evaluate MDS as a carcinogenic end point. So my question is: What criteria are you employing for your assessment that you've provided?

A. I understand that now. I think there was a little confusion generated by perhaps the way I phrased my answer. As you know, apparently, IARC begins with two subclassifications of the evidence, one for humans and one for animals. And then from those two subclassifications, it attempts to derive an overall categorization. What I was trying to say when I referred to IARC was that that's what I would do for benzene and MDS. That is I would ask whether or not the human evidence is sufficient, limited, or inadequate, and I would ask whether the animal evidence

is sufficient, limited, or adequate. And I would require before I could make a causal inference that the human evidence is sufficient. And as I would have understood it in this case, it wasn't for benzene but for diesel exhaust. However, I say the same thing for benzene.

Q. Well, you're referring to IARC Group 1. Correct? When you say sufficient, sufficient evidence of carcinogenicity in humans, you're referring to a Group 1 designation by IARC. True?

A. Yes. I think that is equivalent.

Q. And the standard that IARC employs for making that determination is in part, in large part epidemiology. True?

A. There are two answers to that question or two parts to an answer. It used to be true that the judgment with regard to the human evidence had to be in the category sufficient for an agent to fall into the overall judgment of Group 1 sufficient evidence. However, about five or six years ago, they modified that criterion and have relaxed it somewhat. I consider that inappropriate, and I have not made that relaxation.

Q. Fine. Under the former unrelaxed standard, what was the standard as you understand it for epidemiologic evidence for IARC to deem a chemical carcinogenic to humans?

A. In the final analysis, it became -- it could be defined as a majority vote of the working group.

Q. Okay. And the working group evaluated the evidence using certain criteria, however. True?

A. Well, those criteria -- the answer to your question is yes, that's true.

Q. And are those the same criteria that you're using for your assessment or not?

A. Well, now I have to develop the answer because --

Q. Please.

A. -- each individual member of the working group was allowed to reach his or her own judgment in his or her own way. And beyond that the criteria were rather general and basically were of the type that there is a reasonably consistent, often statistically significant, unlikely to be confounded set of findings. And whether or not those criteria were fulfilled was a judgment that each member of the working group made, and I'm saying that that's a judgment that I also attempt to make.

Q. And your personal judgment on this issue based upon what you've reviewed is that there's insufficient evidence for benzene and MDS?

A. And for diesel and MDS.

Q. Okay.

A. And for diesel and AML.

Q. Okay. Now, it's true at that IARC has never evaluated benzene and MDS employing those criteria. True?

A. I can't affirm that that is true, but I would say that it is probably true, and I don't know that they have. I wouldn't think they would because MDS is not a cancer.

Q. Right. Okay. Now, lastly, we did get faxed or e-mailed here a list of cases. I'd like you to take a look at that.

A. You said last week?

Q. Lastly.

A. Lastly. Sorry.

Q. And my question is: Which of those cases there concern benzene?

A. All right. I'll need a minute to go through this.

Q. Sure.

A. (Witness peruses document.)

If we look at No. 9, this is actually a diesel exposure and to some extent benzene. However, the outcome is not an LHC.

13, there are actually two cases there. The Martindale case is a benzene, and as I recall it was CLL, and the Casas is benzene and pancreas cancer.

Q. What was the name of the attorney who took your deposition in those cases?

A. In Casas and Martindale?
Q. Yes.
A. I don't recall his name.
Q. Was it Herschell Hobson, by chance?
A. No.
Q. Have you been deposed by Herschell Hobson?
A. On one occasion many, many years ago. This person may have been in his firm, but I don't recall his name. Let me just finish.
Q. Go ahead.
A. Well, 14, of course, is the same. 15 is a case in which benzene is one of the issues. Is this your copy or mine?
Q. Yes, it was. Thank you. Okay. We are done. Same stip?
MR. AMUNDSON: Same stip.
MR. METZGER: Based upon the prior agreement that I believe we reached regarding signing and execution and changes, the stipulation will be that the court reporter may forward the original transcript directly to Dr. Cole; and that he may have until February 19th to make the corrections that he wishes and sign the transcript and notify me of the changes, notify all counsel of the changes; he will then forward the original transcript to me, and I will keep it; if the original is not signed or

is somehow lost, a certified copy may be used with full force and effect.

(Discussion held off the record.)

MR. AMUNDSON: So we're amending the stipulation that in the event Dr. Cole does not receive the deposition, the original transcript until after the 19th, or even if it's a day before the 19th, we will give him an extra week from his receipt to sign it. And then we'll make our best efforts to immediately notify all parties.

MR. METZGER: He's notifying us.

MR. AMUNDSON: He will notify us, or perhaps he'll ask us to notify you. But you will get notification either way --

MR. METZGER: Right.

MR. AMUNDSON: -- within a week of his receipt.

THE REPORTER: Do you want a copy, Counsel?

MR. AMUNDSON: Yes, please.

(Proceedings concluded at 2:23 p.m.)

* * *

DECLARATION

I hereby declare I am the deponent in the within matter; that I have read the foregoing deposition and know the contents thereof, and I declare that the same is true of my knowledge except as to the matters which are therein stated upon my information or belief, and as to those matters, I believe it to be true.

I declare under the penalties of perjury of the State of California that the foregoing is true and correct.

Executed this day of , 200 , at , California.

PHILIP COLE, M.D.