IN THE UNITED STATES DISTRICT COURT

FOR THE NORTHERN DISTRICT OF ALABAMA

EASTERN DIVISION

SOLUTIA, INC., AND PHARMACIA CORP.,

Plaintiffs,

vs. No. CV-03-PWG-1345-E

McWANE, INC., ET AL.,

Defendants.

VIDEOTAPED DEPOSITION of ROBERT KALEY, Ph.D.

Taken on December 8th, 2009

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Defendants.

VIDEOTAPED DEPOSITION OF ROBERT KALEY, Ph.D., taken on behalf of the Defendant Phelps Dodge Industries, Inc., at the offices of Husch Blackwell Sanders, LLP, 190 Carondelet Plaza, Suite 600, St. Louis, Missouri, on the 8th day of December, 2009, before Pamela Watson Harrison, CBC, CRR, RPR, MO CCR #557, IL CSR #084-003684, and Notary Public.

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EXHIBITS

EXHIBITS (continued)

THE VIDEOGRAPHER: We're on the record at 9:15 a.m. The date is December 8th of the year 2009. We're at the offices of Husch Blackwell Sanders. The address is 190 Carondelet in St. Louis, Missouri.

This begins videotape No. 1 in the deposition of Dr. Robert G. Kaley in the matter of Solucia, Incorporated, and Pharmacia Corporation versus McWane, Incorporated, et al., currently pending in the United States District Court for the Northern District of Alabama, Eastern Division, case No. CV-03-PWG-1345-E.

At this time, could I ask counsel to identify themselves for the record, please?

MR. MERRILL: Yeah. I'm Charlie Merrill representing the plaintiffs, Solucia and Pharmacia.

MR. SCHICK: Bob Schick on behalf of Phelps Dodge with Vinson & Elkins.

MR. LIPPARD: Ben Lippard also with Vinson & Elkins on behalf of Phelps Dodge.

MS. LAVEY: Wendy Lavey with Squire, Sanders & Dempsey on behalf of Defendant MeadWestvaco Corporation.

MR. SCHICK: And on the phone?

MS. LEMMER: This is Julie Lemmer with

Alston & Bird on behalf of U.S. Pipe & Foundry.

MR. SCOTT: John Scott with Scott, Dukes & Geisler for Huron Valley Steel Corporation.

MS. SMITH: Lynette Smith at Troutman Sanders for Scientific Atlanta.

MS. McADAM: Allison McAdam at Hunsucker Goodstein & Nelson for Southern Tool.

MR. NICHOLS: Brian Nichols from Maynard, Cooper & Gale on behalf of McWane, Inc., BAE Systems Land and Armaments, LP, and FMC Corporation.

MR. HEISTER: Michael Heister on behalf of DII Industries.

THE VIDEOGRAPHER: Was that all counsel? Thank you.

Would the court reporter please swear the witness?

(Witness sworn.)

ROBERT KALEY, Ph.D.,

of lawful age, having been first duly sworn to testify the truth, the whole truth, and nothing but the truth in the case aforesaid, deposes and says in reply to oral interrogatories propounded as follows, to-wit:

EXAMINATION

QUESTIONS BY MR. SCHICK:

Q Would you state your full name, please, sir?

A Yes. It's Robert George Kaley, II.

Q Dr. Kaley, my name is Bob Schick. I represent Phelps Dodge in a lawsuit that Solucia has brought against a number of other defendants that's pending in Birmingham, Alabama.

You're familiar with that lawsuit, are you not?

A Yes.

Q In fact, you've given your deposition in that lawsuit in the past?

A Yes.

Q You know that in today's deposition you are being presented on behalf of the company as what's referred to under the federal rules as a 30(b)6 witness; do you understand that?

A Yes, I do.

Q And do you know that what that means is that you're speaking on behalf of the company -- that is, Solucia -- in connection with the testimony you're giving here today?

A Yes, I understand.

Q Okay. Fair enough. What I'd like to do just so that we know the parameters of what you're being offered for here today is show you what's been marked as Deposition Exhibit No. 1 to your deposition.

Do you have that in front of you?

A Yes, I do.

Q And in particular on page 7, this is a letter from your counsel, Mr. Merrill, and it outlines the topics on which you intend to give testimony today.

Is that your understanding?

A Yes, it is.

Q Am I correct in understanding, then, that you will give your testimony today with respect to whatever knowledge you have about the mobility or motility of PCBs in the environment, volatilization of PCBs contained in soil, sediments, and surface waters, weathering of PCBs, dechlorination of PCBs,

and adsorption of PCBs in particles in air or water?

A Yes, I understand.

Q All right. There is a note that your counsel provided underneath No. 12 saying that testimony on this topic and its subparts will not cover facts known or opinions held by experts other than you, Dr. Kaley, who may testify.

And my question to you is: Have you spoken with any experts who have been retained on behalf of Solucia with respect to these topics?

I'm not asking --

A Yeah, I understand. I'm trying -- I'm looking at the topics to see. To some extent, yes.

Q And without telling me what you discussed, can you tell me which experts you talked with?

A Dr. Menzie.

Q Other than Dr. Menzie?

A With respect to these topics, I don't believe so, no.

Q Okay. Fair enough. You can take that down. Thank you.

Am I correct in understanding that you are now employed by the Husch Blackwell Sanders law firm?

A No.

Q Okay. I was under the impression that in 2005 you actually became a technical advisor to the law firm.

Is that not correct?

A No. I'm an independent consultant.

Q Okay. And you charge on an independent basis for the time that you put in on a particular matter?

A Yes.

Q Can you give me an approximation as to --

A Well, that's not correct. I'm on retainer through the Husch law firm to Pharmacia in support of whatever they need on -- on various issues. So I -- I don't charge by the hour for particular activities. I'm on retainer.

Q And are you still on retainer at the $13,500 a month?

A No. It's actually 15,000 now.

Q And does your paycheck come from the Husch Blackwell firm or from Solucia?

A It's drawn on Husch Blackwell.

Q Okay. Fair enough.

Dr. Kaley, what is a PCB?

A Well, a PCB is -- PCB isn't an A. It's a -- it's a term that encompasses 209 materials known as

chlorinated -- polychlorinated biphenyls.

Q What is an Aroclor?

A Aroclor is a Monsanto tradename for a line of polychlorinated polyphenols that were manufactured by the company.

Q And they were manufactured by the company during what period of time?

A From 1935 through 1977.

Q You're familiar with the various Aroclors that were manufactured by Monsanto, Solucia's predecessor, in Anniston, Alabama?

A Yes, I am.

Q And are you familiar generally with the production of Aroclors in Anniston over that period of time?

A Yes, I am.

Q For example, are you familiar with the fact -- and we can look at documents later -- that approximately 59 percent of the production was of Aroclor 1242, for example?

A I don't know the percentages offhand.

Q Okay. Fair enough. We'll take a look at that later.

What is a homologue, as that term is used in connection with PCB?

A A homologue is a term that has been used to describe -- well, let me -- let me step back and say that PCBs can have either 1 up to 10 chlorines on the biphenyl molecule, and a homologue is a way of describing the polychlorinated biphenyls as to the number of chlorines on the monologue -- on the molecule. So there are 10 homologues of PCBs.

Q And the 10th is referred to as decachlorobiphenyl?

A That's correct.

Q Okay. What is a congener, as that term is used in connection with PCBs?

A As I mentioned, there are 209 individual chemical compounds that fall under the rubric of PCBs, and a congener is any single one of those compounds.

Q And is a congener based on its location on one or the other of the biphenyl rings?

A Well, I mean, the congener -- each congener is defined basically by the number of chlorines and the position of the chlorines on that ring.

Q Then what's the difference between a congener and a homologue?

A Well, a homologue is just the number of chlorines. So, for example, if we think about a

material with three chlorines on the ring, the trichloral homologue, there are actually 24 individual compounds, individual congeners, that have three chlorines on the ring; but they are in different positions.

Q Fair enough. And let me ask you this: What's the basis of your knowledge about these things that we've been talking about, congeners and homologues and polychlorinated biphenyls?

A Well, I'm trained as an analytical chemist, and I was in the laboratory for a dozen years. And after that I've maintained a reading knowledge and literature knowledge of PCBs in general.

Q And did you actually work with PCBs in the laboratory?

A Yes, I did.

Q Was that a part of your employment at Monsanto?

A Yes, it was.

Q And just to refresh my memory, during what years were you employed by Monsanto?

A From 1973 until 1997 when Solucia was spun off.

Q Then you went with Solucia until what year?

A 2003.

Q Okay. In addition to review of literature, your personal experience, and your training in chemistry, have you also learned about congeners, homologues, and PCBs in discussing them with other individuals?

A Well, with regard to those particular terms, no. I mean, I've known what those terms have meant since basically the beginning of my career at Monsanto. So, no.

Q With respect to the ways in which PCBs act in the environment -- that is, either in air or in water or in sediment -- did you derive any of your knowledge in those areas from anything other than your own personal experience and literature reviews?

A Well, attendance at meetings and listening to presentations by other persons.

Q Meetings primarily of Monsanto/Solucia or meetings, for example, of the American Chemical?

A Well, that would be an example. The American Chemical Society meetings are not among those that I've attended, but that's -- that's an example of the kind of meeting -- technical outside meetings.

Q Is there an individual with Solucia or -- and I mean either an employee or a consultant like

you are today -- who you believe knows more than you do about the -- the ways in which PCBs act in the environment in air, water or sediment?

A That's a trap question.

Q Yeah. In a way it is.

A I suppose there are certainly persons out there who may know more on specific general technical areas, but I think I have as good an overview of that as anybody I know, I guess.

Q Does Dr. Menzie know more than you? And if so, in what area?

A He may know more on the details of fate and transport, but I don't -- I don't consider that he knows all that much more than I do. He may know more on a technical basis, but certainly he's very knowledgeable. I'm not questioning his knowledge. He's a very knowledgeable man.

Q What is meant by fate and transport?

A Well, basically the terms fate and transport describe the behavior of any chemical as it's introduced, primarily into the environment. It doesn't have to be in the environment, but that's generally the way the terms are used.

And basically the fate is what happens to that chemical. Does it stay as the chemical as it

was introduced or does it change somehow?

And then the transport is how is that chemical moved about the environment.

Q What information does Monsanto or Solucia -- by the way, can I use those terms interchangeably in this deposition?

A Yes. If -- Monsanto is fine.

Q Okay.

A That's the way I think.

Q Okay. Fair enough. What information does Monsanto have that you know of in its possession regarding the behavior of -- of various forms of PCBs in the environment?

A I assume there are business documents that might address that particular -- particular aspect, and I assume there are people who have scientific publications on that. I don't know specifically what they have in their possession.

Q Are there -- is there scientific literature that's been developed by Monsanto or its people, its employees, that you've relied on in learning about the behavior of PCBs in the environment?

A There is some of that.

Q Can you identify what literature in particular you rely on?

A Well, there -- when I joined Monsanto in 1973, I joined a company that was -- a company -- a group that was actively involved in measuring some of the environmental properties of PCBs and the behavior of PCBs, the biodegradation of PCBs. So -- and some of that work has been published.

So through my interaction with that group and learning what went on before me and participating in the group after I got there, I've certainly learned many of the things that are addressed on these topics.

Q What was the name of that group that you joined?

A It was a group called applied sciences in the industrial chemical company.

Q And that was a part, a department, of Monsanto?

A Yes.

Q And was that research that was done by that group and the review that that group did of the activities of PCB in the environment -- was that broken down into the behavior of Aroclors and the behavior of homologues?

A It was primarily the behavior of Aroclors at that time frame. Really the analytical chemistry to

analyze congeners and then subsequently homologues had not fully been developed. So it was primarily focused on the behavior of the products.

Q When was the technology developed to follow homologues and congeners?

A Well, it was beginning to be developed in the 1970s. Really continued to develop through the 1980s and really only came into fruition in the 1990s.

Q And what are the techniques for following congeners and homologues and their activity in the environment that came about really in the 1990s?

A The -- there are two techniques that are used in conjunction. One is gas chromatography which is a separation technique, and the other is mass spectometry which is an identification technique. And that -- that combination has really led to the development of the ability to do the analyses as we know it today.

Q What are those two scientific techniques able to do with respect to the identification of congeners and homologues?

A Well, the first technique, gas chromatography, takes a complex mixture of chemicals, including PCBs, and separates them on

a -- basically a class column so that the individual compounds are separated from one another in time as they leave the instrument. And then the mass spectrometer can be used in two ways. It can be used to identify the particular compound as it comes out of gas chromatograph, or in a more sensitive mode, it can be used to measure the amount of that compound as it comes out of the chromatograph.

Q And what does that tell you, then, about what you're looking at with respect to either an Aroclor or a homologue?

A Well, at that point it doesn't tell you very much about whether you're looking at an Aroclor, but -- or a -- but it tells you basically which individual PCB congener is coming out of the chromatograph at that individual time. So you have a -- you have a specific identification of one of the 209 congeners or a measurement of how much that congener is present in the sample.

Q Does it also tell you how much of a particular homologue you have in that sample?

A No. That's a subsequent calculation. Basically you just, through the computer, add up all of the totals for individual -- for instance, the 24 trichlorobiphenyl congeners, you just select those

out of your instrument output and add them up to get the homologue number.

Q Okay. Fair enough. And how long has that technology been available? You said the '90s.

A Well, that's when it really has reached perfection. I mean, the techniques were beginning to be developed in the 1980s and probably even the late 1970s, but it's -- it's a -- it's a moving target; and the techniques and the abilities to measure lower levels and the abilities to separate the congeners more effectively have continued to develop even today.

Q And am I correct in understanding the extent to which you've been able to measure congeners then translates into an ability to identify homologues?

A Well, you really don't identify homologues. They are basically defined as the particular groups of congeners. So, I mean, to some extent what you're saying is true, but it's -- it's really a homologue is a derivative concept from the ability to measure congeners.

Q Have you or others at Monsanto to your knowledge performed studies or experiments with respect to the reliability of these sorts of tests in identifying congeners?

A Well, we certainly -- during my time in the laboratory, which basically ended about 1985, we -- we certainly did those kinds of measurements with techniques that were available at the time and certainly did measure -- you know, had some way of assessing the reliability of those analyses.

Q For what purpose would you do those sorts of analyses?

A Well, primarily to look at, I guess, in general at that time frame, the presence and identification of the PCBs in environmental samples.

Q But why would you want to know what particular congener or what mix of congeners was in a particular sample of a PCB?

A Well, it's -- it's just -- part of it is just a desire to have as much information as possible. PCBs change when they get into the environment. So an Aroclor 1242 that may have been introduced in the environment 10 or 15 years down the road may or may not be identifiable as Aroclor 1242. It changes.

So really the information is -- is much more full for a particular analysis if you know the congeners rather than trying to look for a particular Aroclor which may no longer be there in

that form.

Q And by doing the congener analysis, are you able to determine whether that 1242 that you've identified just as sort of the general Aroclor was indeed something different when it was first introduced in the environment?

A Well, that -- that question cannot be answered in the general, because it depends on the particular site and what you know about that site and the time frame and a lot of things. So I don't really think there's a general answer to that question.

Q Then why do it? Then why do the gas chromatograph or the --

A Well, because each --

Q -- mass spectrometer?

A I'm sorry. I didn't mean to interrupt. Well, at each particular site, if you have a reason for doing particular analyses, the information you get from congener-specific analysis will provide you a better basis to make judgments about that -- about that particular sample, as to amounts, as to potential sources, as to potential toxicity, for example. There's just so much more information available on a congener-specific analysis.

Q So you're still having to make a judgment even after these tests as to, for example, what that Aroclor was when it was first introduced into the environment?

A Well --

Q It is not scientifically verifiable?

A I'm not quite sure how to answer that. I suppose that if -- if in the context of the analyses you know -- that you are doing that you know that it was Aroclor 1242 that was introduced into the environment and you can measure the particular congeners in the sample as it was -- as it was used and introduced and compare it to what you're finding now, you may be able to do that.

But just to randomly go out and take a sample and say, Oh, I know that's Aroclor 1242, I don't think that's really possible.

Q So if you identify as an Aroclor today in 2009, an Aroclor 1242, and you do your congener analysis through a gas chromatograph and mass spectometry, what help does it give you in determining what that Aroclor was when it was first introduced in the environment?

A Well, it may not give you any. If that's the question you're asking, then you have to think

about how you would use that information. Typically that's not the question you're asking. Typically the question you're asking is: What is there as we sit here today?

Q Okay. Now, with respect to doing these sorts of tests, the two tests that we've been talking about -- and that's gas chromatograph and mass spectometry --

A Uh-huh.

Q -- did Solucia, Monsanto, perform those sorts of tests in connection with various reporting that it's done in Anniston to the EPA?

A At that time frame, the analyses were done by outside contractors. They were not done by Monsanto or Solucia, per se.

Q And when you say at that time, which time frame are you talking about? Is this the early 2000s?

A Well, beginning in the -- basically the early 1990s actually.

Q And were those outside consultants using gas chromatographs or mass spectrometry?

A One or other or both, yes.

Q Okay. How do you know that?

A I, in many cases, spoke with the analysts,

and I've seen -- in the course of my employment, saw many results from those -- those analyses and had an understanding of how they were done.

Q And what did those analyses provide in the way of scientific verifiability as to whether the Aroclors had changed over time or what the source was?

A Basically none.

Q Okay. Okay. Let's talk a little bit about mobility of PCBs in the environment, okay?

A All right.

Q What are the mechanisms by which PCBs can move through the environment, Dr. Kaley?

A Well, generally I guess we think of -- of the three states of matter as being solid, liquid, and vapor. So with regard to vapor, PCBs can be in a vapor state and move through the environment that way, or they can in kind of a combination of solid and vapor be attached to particles which can move through the environment.

With regard to water, PCBs, although they're very sparingly soluble in water, can actually dissolve some PCBs to a -- to a given extent and be carried as mole -- or as molecules dissolve in that water, or again they can be transported by water as

adsorbed to parallel material.

And then with regard to soils or sediments, solids, PCBs adhere very strongly to those kinds of materials. Generally don't move from -- from where they were originally deposited.

Q Unless there was material --

A Unless, unless, by other -- the other two mechanisms we've talked about before. Unless they're moved by wind, as in the air process, or moved by water.

Q Okay. And -- and more generally let me ask this: Can PCBs travel via air?

A To some extent, yes.

Q All right. And we know that PCBs can travel via water bodies?

A Via moving water, yes.

Q Okay. And PCBs can also travel through sediment migrating downstream in bodies of water?

A Yes.

Q PCBs also can be transported by storm runoff? And that may be redundant, if we're talking about the movement of water.

But if there's storm runoff and that -- that water can pick up PCBs and move the PCBs?

A Generally picking up particles that have

PCBs on it, yes, that's true.

Q All right. Unless the PCBs are of the sort that are soluble or can become soluble in water?

A Well, I wouldn't say unless. PCBs are very -- you know, to -- in the -- in the general vernacular, PCBs are very, very, very insoluble. So even if certain congeners or certain portions of products do have some slight water solubility, by far the greatest amount is still going to be adhering to particles. So it's not an either/or. It's a -- it's a major -- or the major amount of PCBs are going to be on solids, and some minor amount may be in water or in air.

Q Okay. So generally speaking, most movement of PCBs will be through the attachment of those PCBs to particulate matter?

A That's correct.

Q All right. Now, is that different, that statement, about most move as a function of their attachment to particulate matter, for different Aroclors? That is, is it going to be different for a 1268 versus a 1242?

A Well, I'm going to go -- I'm going to go back to the congener argument again.

Q Okay.

A One of the reasons you do congeners is because the actual properties of the individual PCBs depend on the congeners. So that the lower chlorinated congeners typically will have higher water solubility.

Now, to the extent that an Aroclor 1242 has more of those lower chlorinated congeners than, for example, an Aroclor 1260, your statement is true. But you really can't talk about Aroclors in that particular manner. You're really talking about the congeners that make up those particular Aroclors.

Q Because the Aroclor is a mixture of a number of four, five, six different congeners?

A More like 50 to 100.

Q Okay. And what about with respect to homologues; can you look at homologues to understand a difference in terms of the mechanisms of movement through the environment?

A To a certain extent, yes. Because homologues as we've discussed is basically an agglomeration or a combination of the various -- of the various congeners. So in general the congeners of the same level of chlorination have generally the same properties, although not necessarily exactly the same properties.

So trichloral biphenyls as a whole, the homologue trichloral biphenyls, is in general going to be less soluble than the hexachlorobiphenyls.

Q Okay. What about with respect to movement via air; any difference among the homologues?

A Yes. Even -- probably even more so, in that the lower chlorinated congeners are typically, you know, more exaggerated in their ability to enter the gas phase than are the higher chlorinated materials. But again, in either case, it's very -- we're talking about very, very, very small amounts entering into the gas phase.

Q And when we talk gas phase, we're talking vapor?

A Yes, primarily, yes. At this point, yes.

Q All right. And so what you're saying is the lower chlorinated congeners will vaporize more easily than the higher chlorinated congeners?

A Exactly.

Q Have you done any or are you aware of any studies that have been done with respect to the percentage of the lower chlorinated congener that can become vaporized under certain conditions?

A Well, I know there are vapor pressure kinds of measurements that I think you can back calculate

that. As I sit here, I don't -- I can't give you a number. But it's a very, very small number.

Q Okay. Now, I think what you've told me is that when PCBs are admitted to the -- are emitted to the atmosphere, it's either going to be in a vapor or particulate phase?

A That's correct, yes.

Q And am I correct in understanding you that what you're saying is it's more likely to occur in the particulate phase than in a vapor phase?

A Well, again, I think that depends on the system you're talking about. I don't think there's necessarily a general answer to that. You have to talk about --

Q A specific congener?

A Well, a specific congener and a specific scenario.

Q And what do you mean by scenario?

A Well, I mean, are you talking -- if you're doing an air measurement of PCBs, are you -- are you measuring PCBs in the atmosphere over the Arctic, or are you measuring PCBs next to a junkyard where there's soil contaminated with PCBs and you're in a wind storm? I mean, it really depends. There's no -- you know, it depends on the scenario.

Q Okay. Wind certainly plays a factor in -- in determining the transport of PCBs, whether in the vapor phase or a particulate?

A Sure.

Q Okay.

A I mean, wind defined as movement of air, yes.

Q Now, given your understanding of the various properties of the different Aroclors, which Aroclors or their homologues, whichever is most comfortable to you, are more likely to be released in a vapor form?

A Well, the Aroclors with the lower chlorinated congeners is their primary constituent. So to the extent if you're looking at the -- at the materials that were commonly manufactured by Monsanto, Aroclor 1221 would be the most likely to be found in the vapor form, and Aroclor 1260 or higher would be the least likely.

Q Okay. And that's sort of the continuum, from a 1221 to 1260 or 1260-A?

A Right. I'm sure you know that the last two numbers designate the percentage of chlorine in the molecules, and that percentage of chlorines is basically dependent on the number of chlorines on

the individual PCB molecules. So the higher percentage and the higher numbers in the Aroclor series are going to have the more highly chlorinated compounds.

Q Okay. And the more highly chlorinated, the less likely to vaporize?

A Correct.

Q All right. Now, which Aroclor or their -- its homologue is more likely to be emitted to the atmosphere in a small particulate versus a large particulate? And I guess I'm talking about less than 10 microns.

A Well, when I'm talking about PCBs on particulates, I'm not talking about individual PCB molecules or particulates being emitted. I'm generally talking about PCBs being adsorbed onto a soil or sediment particle which is subsequently moved by the air transport system. So to that extent, there's really no difference. Any of them are going to adsorb to the soil and could be moved by that mechanism.

Q And is that true for any homologue; that any homologue can be adsorbed into (sic) the soil and can then be moved, whatever size the particulate matter is?

A As long as it remained adsorbed to that soil. Now, again, there are other processes going on which will change the amount that may or may not be adsorbed to the particular soil particle, depending on the -- basically the chlorination level again. But in general, that's true, yes. Any PCB can adhere to soil.

Q Now, tell me what the differences are that affect that adsorption?

A Well, it's many of the things we've talked about. If you -- if you take a PCB molecule and put it on a particulate of soil, it's going to adhere to it. It's going to stick to it. However, if it has water solubility, if water runs over that soil particulate, it may absorb that PCB molecule or may not. I mean, it's -- if you're looking at an individual molecule, it's hard to say.

But in the agglomeration, if you have lower chlorinated -- excuse me. I'm talking too fast.

If you have lower chlorinated materials and water passes over them, then some of those lower chlorinated materials are going to dissolve in that water and be moved away, leaving less on the soil. The same is true if that soil particulate is sitting out in the hot sun and there's a lower chlorinated

material on it. It's more likely that some of that is going to evaporate into the air, and so there will be less on the soil.

Q And what remains on the soil would be the more heavily chlorinated homologue?

A That's correct.

Q Did I say that correctly?

A You said it very precisely, yes.

Q All right.

A I mean, that's a general statement, but that is a true general statement.

Q Okay.

A I mean, that's basically one of the things -- number C is weathering. And that's basically the concept of weathering right there.

Q Okay. And when you talked about the lower chlorinated homologue being washed off in the water, it's actually removed from the particulate matter, the piece, the speck of soil, and it's adsorbed into (sic) the water then?

A Well, absorbed, yes. But now, again, I'm not talking about, you know, if you've got -- obviously molecules are very, very, very small. So I'm talking about things in the conglomerate. Some of those molecules may -- of that particular

homologue may be absorb -- ad -- may dissolve into the water and be move that way or may evaporate. But the bulk of those molecules of that homologue are going to stay right where they are.

Q Okay. The bulk being the heavier ones?

A No. The bulk being the mass of that particular homologue.

Q Because mass is what really controls its sticking ability to the particle?

A Well, now we're kind of talking past each other. I'm talking about mass in the sense of the weight of the Aroclor that's on there. So what I'm saying is if you have a -- some soil and it has -- I'm just going to say a pound. That's a really big number.

But you have a pound of -- of a trichloral homologue, let's say PCB 11, on that -- on that soil and it'll be mixed in with a whole bunch of other homologues and congeners. Then water rushes over it and the sun is shining on it. Then some of those PCB 11s are going to evaporate, a very, very small amount. A very, very small amount of those PCB 11s are going to move with the water that's moving. Most of those PCB 11s are going to stay right on the soil where they were.

Q And the only ones that are going to move are going to be the lightest chlorinated or the least chlorinated --

A It's a --

Q -- more than likely?

A It's a gradation, yes. I mean, it's -- you know, those are the most likely to move. But even the higher can move to some, you know, increasingly small extent.

Q Have you done research with respect to the -- we've talked -- let me start over.

We talked about both water, but you also have mentioned temperature. Have -- have you done or to your knowledge has Monsanto done studies about the extent to which certain temperatures release or volatilize certain homologues?

A I don't know that the term is experiment. I know Monsanto at some point generated vapor pressure curves for PCBs, how much PC -- different PCBs evaporate at different temperatures and drew a graph of that. So, I mean, they have done work in that -- in that line, yes. But primarily at elevated, very elevated, temperatures that are more relevant to the manufacture or use situation rather than the environmental situation.

Q Let's talk about vapors for a minute. When -- when PCB vapors are emitted to the atmosphere, do they recondense?

A Yes.

Q How quickly do they recondense?

A Generally very quickly, but again that depends on the temperature and -- and what the state of the system is and where they are.

Q And the speed at which they've been emitted?

A Sure, to some extent I would think, yes.

Q When they do recondense, what size particle is formed?

A Well, it's not really. I mean, usually when something recondenses, it's going to recondense from a vapor phase as more of a film than a -- than a particle. I mean, it may -- it may be a film on a particle, but it's likely to condense as a film. It's going to -- once you get enough of them condensing, it's going to revert to its liquid state. I mean, it's basically the same as dew forming in the morning. You have water vapor in the air. As the temperature cools, those water vapor molecules start adhering to grass or whatever, and it gets wet. It's the same concept.

Q And condensing into?

A A film. In general, you won't see -- I mean, with PCBs you're not going to see a droplet because there's not that much in the -- in the vapor phase to begin with. But you'll see or be able to measure a film that would be -- that would be condensing onto whatever surface was available or onto the soils.

Q Does the ability to condense or the likelihood of condensation vary by congener or homologue?

A Sure. It's --

Q In what way?

A Well, again, the lower chlorinated congeners are more likely to remain in the vapor phase, and the higher chlorinated are more likely to condense out as the temperature drops.

Q And what happens to those that remain in the vapor phase for a longer period of time?

A Well, I mean, in the ultimate if you read the literature, you know, some teeny amount of them make it to the Arctic. Eventually they're going to condense out or, you know, remain. There's probably a give and take. There are, you know, PCBs that are being condensed at the same time there are being -- PCBs that are being evaporated. So you have an

interchange of molecules, but in general they can -- you know, I mean, it's claimed in the literature they can at some trace levels move globally in the atmosphere.

Q And does that ability to condense also vary based on the temperature?

A Sure.

Q So in addition to chlorination, temperature would be a variable?

A Absolutely.

Q All right. When PCBs are present in the atmosphere, do they or can they adhere to particles that are in the atmosphere that they come across?

A Yes.

Q Okay. And what's the mechanism by which they do that? Is it just mechanical?

A Yes, basically.

Q Huh?

A Basically. I mean, they'd rather be attached to something than -- than in the vapor phase. So, yeah, they basically -- it's basically a mechanical.

Q Does that mechanical attachment to particulate matter vary by -- by Aroclor?

A Good question. I don't know that the

attachment varies, but certainly by Aroclor the -- the tendency to remain attached varies because of the different things we've talked about: vapor pressures and water solubility.

Q Again --

A They all want to be attached to soil particles, but the higher chlorinated Aroclors or homologues are going to be more firmly attached, more tenaciously attached, than the lower chlorinated materials.

Q Harder to disattach, revaporize, the heavier chlorinated homologues or congeners?

A Right.

Q Is it possible for air transport to disperse Aroclors or any of their homologue or congener components within the Anniston area?

A Well, I mean, Anniston is no different than the rest of the world. So, yeah, I mean.

Q They're going to get in the environment, in the air?

A If PCBs -- I mean, I'm sure there are PCBs in the air in Anniston as well as they are in St. Louis. So, yes.

Q Okay. Are certain Aroclors going to migrate in the air further than others?

A I'm just -- not necessarily further but more of them may. So it -- so the answer to your question may look like they're migrating further, but it's primarily a more quantitative thought than it is a qualitative thought. I mean, a vaporized molecule in the air is going to move however it's going to move. And so it -- it doesn't necessarily because of its, you know, individual molecular makeup make it move further. It's just more likely that some of them are more likely to be in the vapor phase and to redistribute into the vapor phase. So it will look like they're moving further; let's put it that way.

Q Okay. Well, but if we go back to your comments about finding PCBs in St. Louis or PCBs in the Arctic, I mean, that clearly demonstrates an ability to disperse some --

A Yes.

Q -- major distances, true?

A No question.

Q And I just need to understand from you are -- is it your view that it is the lower chlorinated congeners or homologues that are going to disperse greater distances than the heavier chlorinated homologues and congeners?

A And I understood that.

Q I thought we were saying the same thing.

A And the reason I'm hesitating a little bit is that if -- if you measure the air in Anniston, which has been done -- that's not a surprise to anyone -- and you look at those results -- basically they've all been reported as homologues, I think -- what you see are the lower chlorinated homologues. There's no question about that. So that's -- that's what seems to be in the air in Anniston, generally true in other cities that have had air measurements done. Recently in Chicago, for example. The lower chlorinated materials are what you see.

However, when you go up to the Arctic and start looking for PCBs in snow or whatever, you don't necessarily see only the lower chlorinated materials, surprisingly to me. And so eventually all of them manage to make their way up there one way or another, and they more -- they seem to more reflect the normal environmental distribution of PCBs in sediments and soils than they do the air distribution that we see when we measure them in air.

Q Well, how would --

A Am I making sense?

Q Well, I'm not sure.

A I think it's just because it's an integration over time that the materials, the heavier, once they get up there, they tend to stay put better so that it kind of evens out the distribution.

Q But how would heavier chlorinated PCBs or congeners, homologues, get to the Arctic?

A Well, they can -- they can be in the vapor phase. They're just not as likely to be in the vapor phase.

Q I see.

A So as -- you know, over time once they get up there, they're more likely to stay there while the lower chlorinated materials, even in Arctic conditions, are more likely to come back off those soil particles or stuff and get back into circulation. So I'm not sure it's totally understood, and I certainly don't totally understand it. But that's -- that's my understanding.

Q I think I understand that. So what you're saying is, is that once they -- as we would say in Texas, once they light on something, on particulate matter, the heavier chlorinated congeners are less likely to continue movement thereafter?

A Correct. I would agree with that.

Q All right. And the lighter chlorinated congeners, though, may settle once and then be blown in the wind, settle a second time, and this may go on for years and years and miles and miles?

A Yeah. I would agree with that generally, yes.

Q Okay. All right. And -- and as a consequence, then, it's possible, then, for both wind erosion and air to redistribute soils that -- on which congeners have fallen?

A It's possible, yes.

Q Or adhered?

A Correct.

Q And that's true even if we look at an area as definitive and -- and -- and small as the Monsanto plant in Anniston, Alabama?

MR. MERRILL: I'm going to object to the form of the question.

A Yeah, and I'm not sure exactly what you mean.

Q (By Mr. Schick) Okay. I'll restate it.

A I mean, are they being re -- go ahead. I'll let you restate it.

Q Aroclors or congeners that are on the soil

in the plant around the Monsanto plant there in Anniston, after that soil's dried, they can be picked up by the wind and -- and moved, correct?

A Assuming there are PCBs on those soils, that is -- that's a concept, yes.

Q Sure. Okay. All right. Now -- and in fact, what you're telling me, then, is that once they're moved, it's the lighter chlorinated homologues or the lighter chlorinated congeners that may move a second, third, fourth, fifth time?

A Well, not -- okay. Now, but you're going by other mechanisms, not by wind blowing particulates?

Q But it could be by wind blowing particulates, couldn't it?

A No. Because the wind blowing particulates is not discriminating by the particular congeners that are on those particulates. I mean, they're there as such trivially small amounts that it's not changing the characteristic of that particulate. So to a particulate and wind blowing that particulate, it doesn't matter whether it's a monochlorobiphenyl or a hexachlorobiphenyl.

Q Or a decachlorobiphenyl?

A Or a deca, you know, right. It doesn't really matter as long as -- if it's on there and

that soil particle is moving, it's going to move it. It doesn't matter which one it is.

Q Okay. All right. Are you aware of studies suggesting that PCBs are present in tree bark in the Anniston area?

A Yes.

Q You're familiar with the Hermanson study?

A Yes.

Q How do you explain how those PCBs detected in tree bark got there?

A Well, let me first of all say that you have to assume that the analyses were done correctly and that they actually represent what they're purported to represent. But given that assumption, I -- I think it's they probably to some extent or a complete extent are adsorbed from either airborne vaporized PCBs or dust that had lit on -- had lit on those trees, and then the PCBs transferred to the -- to the tree bark, unless it's still on the dirt that's on the tree bark. I don't know.

Q Okay. If PCBs come to rest on the ground, they can re-evaporate into the atmosphere under the right conditions, true?

A Again, depending, right, where the rate would depend on the amount of chlorine on the

molecules.

Q Okay. Dr. Kaley, there's some sampling data that's in the EPA's database that indicates that there are properties that have been identified where there's 12 -- Aroclor 1260 and Aroclor 1268 present, and they're outside the floodplain?

A Yes.

Q And in those properties there's been no finding that Solucia has made any note of, at least, of any foundry material being present.

So my question to you is: How would Aroclors 1260 and 1268 get to properties in the Anniston area outside the floodplain?

A I don't know.

Q I'm sorry?

A I don't know. I mean, it's going to depend -- each one is going to have an individual answer, and I don't necessarily have an answer for any particular one of them as I sit here.

Q Anything other than an air pathway that you can think of?

A Well, other mechanical transport that -- I mean, if you're going to exclude foundry specifically, it could be transport from some other source other than the foundries.

Q Sure. You could have dredged material that was placed there from a waterway?

A That's conceptually correct, yes.

Q But we could also go back to what we were discussing earlier about wind picking up and not discriminating with respect to homologues or blowing that soil elsewhere?

A Well, I think conceptually that's true, but I don't think in reality that mechanism makes sense in the Anniston situation, because if that were the case, you would have a -- a plume or a smooth distribution of those materials over a wider area rather than an isolated finding of those particular Aroclors in a property where there's nothing next door.

So it's conceptual again, and I would also say that the levels found are inconsistent with that because the transport by air, whether higher chlorinated or lower chlorinated, is moving very small amounts of materials. You're not going to be able to accumulate, you know, parts per million of PCBs in soil from parts per trillion of PCBs in air. So I don't really -- as I sit here, don't believe that's a logical mechanism.

Q But, of course, this air movement would take

place over a period of time in Anniston, at least, from 1935 until 1970, true, 35-year period?

A Yes.

Q You're familiar with the Anniston area?

A Yes.

Q Hilly?

A Some of it, yes.

Q Do you know whether the wind blows in -- in consistent patterns and whether there are downdrafts anywhere?

A Well, I'm sure there are. I haven't studied the meteorological conditions, but I'm sure it doesn't blow in the same direction every day at the same speed.

Q Have you seen any air modeling that's been done?

A I don't think I've seen any actual modeling, no. I've seen the -- you know, the measurements and things, but I don't know that I've actually seen any modeling results.

Q If you have PCBs greater than 1 part per million on a particular yard and not on the next door yard, is it equally plausible that it had been in the yard where it's no longer detectable and rain over the years has washed it onto the downstream

yard?

A Again, I suppose in a -- one particular situation, if that describes that particular yard, you could consider that as a possible mechanism. I -- you know, I don't know that that's a general explanation for all the findings in Anniston.

Q But -- but we do know that PCBs can be transported through sediment moved by water?

A Sure.

Q How are PCBs transported when they're present in soils?

We've talked a little bit about air. And they do tend to stick to -- stick in place when they're released?

A Right.

Q I think I heard you say. When they're spilled -- when they're located in soils, do they have a low mobility in the environment?

A I believe as a general concept that's true, yes.

Q Okay. By the way, what's the difference between -- and maybe there isn't one -- but adsorption with a D, as in dog, and absorption with a B, as in boy?

A Adsorption with a D is generally considered

as onto, okay? And absorption is generally considered as into.

Q Okay. Similar to solubility?

A So water -- water would -- water would absorb, with a B, into a sponge; but it would adsorb onto a blade of grass when the dew hits it, because it stays on the surface and sits there.

Q And is that why you used adsorb with -- when referring to various congeners and homologues because they tend to stick and because of their low solubility?

A It's a surficial attachment to the soil particles. They're not actually -- you know, again depending on what particular soil or solid you're talking about, in general they're not absorbed into the interior of those materials.

Q Okay. Dr. Kaley, how are PCBs transported via water?

A Well, I think we talked about that. Some -- some small amount -- or very small amount may be transported as dissolved PCBs in the water, and to the extent there's particulate matter with PCBs on it, a larger amount will be transported by movement of those particulates in the water system.

Q And they can actually be moved in the water

itself, or they can become attached to soil in the -- in the waterway?

A Correct. The second is by far the biggest, the most significant, mechanism of transport. The transport by water, dissolved in water itself, is really very, very small.

Q But if it's not absorbed in the water, it can still flow in the water? Those molecules of heavier chlorinated homologues can still flow in the water?

A If they're dissolved in the water. But the more heavily the chlorinated -- the more heavily chlorinated they are, the far less likely they are to be absorbed or dissolved in the water. We're really moving into a different concept of dissolved versus absorption.

Q Okay. But is that because they fall to the sediment?

A Well, that's -- that would be -- yeah, I mean, that would be the eventual outcome. If they were there, they're more likely to adhere to any particle, whether it's a sediment or whatever it might be or a plant material or something that's in that water phase. The heavier chlorinated materials want to be out of that water a lot more than the

lighter chlorinated materials.

Q And you're aware from the work that you've done over the years that PCBs can be transported a number of miles downstream?

A Certainly.

Q All right. Do the different congeners of PCBs tend to have the same rates of mobility through soil deposition and storm water runoff, or does it vary?

MR. MERRILL: I'm going to object to the form of the question.

Q (By Mr. Schick) Let's take them one at a time. Do the various congeners of PCBs tend to have the same rates of mobility through soil deposition?

A By movement of soils in a water stream?

Q Yes, sir.

A Sure. If they're -- if a PCB, no matter what congener level is adsorbed to a soil parallel, it's going to go with the soil parallel. It doesn't -- I think we've talked. It doesn't matter which -- which congener it is.

Q Right.

A The transport is determined by the transport of the soil particle, not by what PCB is adsorbed to it.

Q It doesn't matter whether it's deca or tetrachlorobiphenyl?

A Correct.

THE VIDEOGRAPHER: Pardon me, Counsel. We have about 3 1/2 minutes.

Q (By Mr. Schick) Okay. What about with respect to rate of mobility in storm water runoff or surface water transport; does it depend on chlorination level? Does it vary by chlorination level, by homologue?

A No. Again, I mean, it's going to be determined by what's moving and how fast it's moving, not by what the chlorination level is.

Q Okay. So one congener doesn't have any greater mobility really than another, in --

A In the terms --

Q -- the --

A -- that we've just --

Q -- water?

A -- been discussing as a congener adhered to a soil particulate and the soil is being moved by water, there's no difference in congener. Now, the term mobility involves a -- is a general -- more general term that talks about some of the other -- that includes some of the other things we've talked

about before: vapor pressure, water solubility. So in general they have -- the lower chlorinated have greater motility but not in the sense we've just been discussing where we have a particle that's being moved by water.

MR. SCHICK: Okay. Good time for a break. Thank you very much.

THE WITNESS: You're welcome.

THE VIDEOGRAPHER: We're off the record at 10:12. This ends tape one.

(Off the record.)

THE VIDEOGRAPHER: We're back on record at 10:20. This begins tape No. 2 of the deposition of Dr. Robert Kaley.

Q (By Mr. Schick) Dr. Kaley, when we took our break, I had asked you about the mobility of PCBs through water and -- and runoff. And -- and you were emphasizing the difference between mobility and motility. What is meant by motility?

A Well, I'm not -- I just wanted to -- I was -- my discrimination was based to make sure we were talking about the same thing. I'm not sure there is any difference between mobility and motility.

Q And you don't mean anything different when

you use one --

A No.

Q -- instead of the other?

A No.

Q Okay. Fair enough. Now I want to talk about something that you've already mentioned and we've talked a little bit about, which is weathering. And what do you mean by the term weathering as relates to PCBs?

A Well, in the overall view, the simplest definition is weathering describes the process or by processes or really the outcome of the processes by which different either physical or biological activities change the composition of a particular PCB mixture that is president -- president -- is present in some typically environmental system.

Q And when we talk about weathering with respect to PCBs, are we talking about loss of chlorination?

A There are a number of processes that -- that are encompassed in the term, and we've talked about most of them. Weathering includes volatilization; it includes solubility and removal from that particular site; it can involve biodegradation; it can involve dechlorination, or other degradation

processes.

Q And -- and I assume that weathering is something that -- as you've just articulated the universe of weathering, something you've studied over your time with Monsanto?

A Yes.

Q And subsequently?

A Yes.

Q And are there formal studies that have been done, either by you or by others at Monsanto, about weathering?

A Not particularly about weathering in general. I mean, certainly we've looked at things like water solubility and things like that. But as far as actually studying weathering itself and those processes, there was some work done on biodegradation of various Aroclors, which is a con -- which is a constituent of the weathering process. But to go out and say we actually were studying weathering, not really, no.

Q Have you done any kind of analysis on a particular homologue or congener with respect to the circumstances under which it dechlorinates or vaporizes?

You've mentioned vapor pressures, but beyond

that, what other analyses are you familiar with?

A Well, as far as anything done at Monsanto, there's nothing. As far as the literature, I mean, I've continued to read a lot of things. I mean, there's a lot of work been published by, for instance, General Electric researchers on dechlorination processes in the Hudson River or things and then just general studies of weathering in general.

Q Have any of those studies that you just mentioned, the GE and the Hudson River, changed your view of the weathering of Aroclors or particular congeners?

A Yes, to a certain extent.

Q In what way?

A Well, I think just the fact that certain PCBs under anaerobic conditions can be dechlorinated in environmental systems leading to lower chlorinated congeners being detected than were originally there. I think it's a concept that's developed over the past 20 years, and certainly when I was doing the analytical chemistry, the concept was always that the homologue mixture or the congener mixture would progress to higher chlorinated congeners.

Q In what -- I'm sorry.

A But I was going to say: Again, the dechlorination only occurs under very specific and not all that usual conditions. So it's certainly had an impact on my thinking, but I don't know that it's changed my general view of how Aroclors weather.

Q And -- and just not to repeat all that we've done in the last hour, but how do they in general weather?

A In general the lower chlorinated -- if you look at a specific site, the lower chlorinated congeners tend to disappear over months to -- weeks to months to years, and the heavier chlorinated materials tend to remain there to be measured.

Q And when they remain there, they're sticking to particulate?

A Generally, yes.

Q But when you say the lighter ends disappear, they don't truly disappear from the universe; they're somewhere, aren't they?

A No. I mean, certainly a lot of them, the lower chlorinated, are biodegraded into carbon dioxide and water. They're gone. So, no. Certainly some of them absolutely -- absolutely do

disappear. Even heavier chlorinated will biodegrade to a certain extent over some period of time. And the dechlorination process, of course, if you're taking a heavier chlorinated material, removing chlorine, making a lighter chlorinated material, then under proper conditions the other kind of biodegradation can occur and those disappear, too. They're basically what they call mineralized, and they're gone.

Q When a particular Aroclor is deposited in the environment, over time and with weathering, can it appear to be a different Aroclor?

A That is -- yes. The answer to that is yes, but that's an oversimplification. It's basically a function of the analytical chemistry that's used to measure Aroclors.

Q And that analytical chemistry is the mass spectometry and gas chromatograph we talked about earlier?

A In that case it's primarily just a gas chromatograph, not a mass spectrometer. Because you're looking at, what we call, an Aroclor analysis, where you're only characterizing by Aroclor. You don't need a mass spec to do that.

Q Well, if we want to characterize by

congener, what do we need?

A Well, you can do it with just a GC, with what they call an electron capture detector, but the mass spec is more sensitive and more precise. But you can do it with just by separation in a gas chromatograph.

Q What about mixtures of PCBs that aren't a specific Aroclor mixture; anything you can tell about those by any kind of test after weathering?

MR. MERRILL: Object to the form of the question.

A Yeah. Again, I think depending on what you're studying and what you're trying to learn by your analyses, you may be able to find some information. But other than that, I'm not sure I understand the question.

Q (By Mr. Schick) Well, let me put it this way: Is weathering always going to make a PCB appear to be less chlorinated than it was originally?

A No. I would say subject to some anaerobic dechlorination, it's always going to make it appear to be more chlorinated.

Q Because the lower chlorinateds have volatized or have disappeared?

A Right.

Q But it does depend on the nature of the environment or the media in which the PCB is located as to how much weathering takes place, true?

A Sure, yes.

Q More weathering, for example, say, on the surface of the soil than subsurface?

A Yes.

Q More -- more weathering -- that is, more dechlorination -- of a PCB in heat than in less heat?

MR. MERRILL: I'll object to the form of the question.

A Probably not. I need to emphasize dechlorination is really a very rare process. Dechlorination only occurs in what they call anaerobic conditions.

Q (By Mr. Schick) Okay. We're talking about two different things, then. I'm sorry. I used it incorrectly.

A Okay.

Q Tell me what dechlorination means.

A Well, dechlorination is the removal of chlorines, okay? De, removed. So if a -- if a particular congener is being dechlorinated, it will

end up with fewer chlorines on it. So, for instance, it can move from a hexachlorobiphenyl -- a hexachlorobiphenyl that is dechlorinated could end up as a trichlorobiphenyl. So it's removal of chlorines. All right?

The only place that occurs in nature is in anaerobic conditions, conditions where no oxygen is present. The only place that occurs in nature is deeply buried sediments. All right? So it's only in water systems that have deeply buried sediments, basically stationary systems, that that dechlorination is occurring.

Q Okay. Otherwise in the nonanaerobic environments, we're looking at more heavily -- after weathering the congener looks more heavily chlorinated than it was earlier?

A No. The mixture taken as a whole looks more heavily chlorinated. You're not -- you're never -- I don't think you're ever -- I'd have to think about it. But in the environment, you're probably never adding chlorines to a congener. It's just that the heavier chlorinated congeners tend to stay longer so that's what you're seeing relative to the lower. So it's a mixture concept. It's not an individual congener concept. You're not changing the congener.

You're changing the overall mixture.

Q Are you changing the homologue?

A Well, you're changing -- again, a homologue is just a -- is an accumulation of -- or an addition of congeners. So you're changing the homologue distribution, but you're not changing -- I mean, you can't really change a homologue because it's a mixture itself. So you're changing the homologue distribution of a -- of a mixture. So you're going to more highly chlorinated -- I mean, the very fact that you're going to more heavily chlorinated congeners left in the sample means you're going to have more heavily chlorinated homologues, because that's all the homologue is, is adding up the congeners.

Q Is a decachlorobiphenyl less likely to weather than a tetrachlorobiphenyl?

A Yes. Again, the individual -- and again, I'm not sure you can talk about weathering -- weathering is a -- is a concept of mixtures. But the things that cause weathering are -- are less likely to occur with decachlorobiphenyl than with a tetrachlorobiphenyl.

Q All right. So weathering does vary by congener or homologue?

A The effect of weathering, yes, I will agree with that. I'm not going to quibble about that.

Q And it also varies, I presume, based on the nature of the environment in which it's located?

A That's correct.

Q Are there established half-lives for various Aroclors or congeners or homologues?

A There are certainty published half-lives for Aroclors, which is kind of a meaningless concept actually, and for congeners, yes. I don't know if they're established, but there are -- there are some that are published.

Q Does weathering actually change the structure of the PCB molecules?

A No. Well, now, that's not true. If you have dechlorination, you are changing the structure of the PCB molecules.

Q That's in the anaerobic environment?

A Right. But in the general -- what I generally consider weathering, solubility, vaporization, that -- those are not changing the structure. Now, biodegradation, of course, is changing the structure of the molecules. It's either, you know, changing the -- you know, well, in some way or another. So, yeah, I mean, after

biodegradation, you no longer have a PCB. You have some subsequent product of that biodegradation.

So, again, you have to differentiate -- I guess the differentiation is between the physical processes that lead to weathering which don't change the molecule and the biochemical or bio -- you know, biological processes which do change the molecules.

Q And what are those biological processes? Are those the anaerobic?

A Well, it can be anaerobic dechlorination or it can be aerobic biodegradation where the molecule is basically oxidized, like food is oxidized in your body.

Q But that requires some other chemical to oxidize?

A Generally it requires little beasties. I mean, at biodegradation it's being --

Q Bugs?

A Bugs, yeah.

Q Let me ask it this way: Can you tell me whether between 1242 and, say, 1248 which one would degrade more quickly in, say, a shallow soil?

A Well, because Aroclor 1242 has more of the lower chlorinated materials, those are more likely to degrade. So 1242 will in general degrade more

quickly as a mixture than Aroclor 1248.

Q Okay. And will the weathering of Aroclors within a landfill similarly differ based on -- based on the amount of heavier end homologues or congeners?

A Well, to the extent that you could hypothesize there would be weathering in a landfill, the answer would be yes. But my guess would be that in a landfill, very little weathering is occurring, because the molecules are not exposed to those forces that -- that encourage weather.

Q Unless they rise to the surface somehow?

A Well, if you can hypothesize a mechanism for that, yeah. I guess if they got to the surface, I wouldn't consider them in the landfill anymore. But, yeah, I mean, obviously if they get to the surface where they can be acted upon by water, you know, bugs, whatever, then sure.

Q Okay. Or taken off by water, as you say, from a landfill?

A If they're exposed, yes.

Q So am I correct, then, in understanding that what might have been originally emitted, let's say, as 1242 can after weathering appear to be more like 1260, Aroclor 1260?

A I'm not sure I would go that far. I might go to a 1248 or a 1254. And the key word is appear. Yes, it could appear or be misidentified as a heavier chlorinated mixture.

Q And why do you not go so far as to go from 1242 to 1260?

A Well, if you look at the congener distribution of those two materials, they don't overlap very -- weathering depends on an overlap of congeners. Again, we're not changing the congeners. All we're doing is changing the relative amounts that are present. And there's so little overlap in the congener makeup of Aroclor 1242; in other words, it has such low levels of the higher chlorinated congeners --

Q Right.

A -- that for it to go all the way to look like 1260 is probably not going to happen.

Q Can 1254 weather to look like 1260?

A That's more likely, yes.

Q Can 1254 weather to look like 1268?

A Probably not.

Q Why not?

A Again, I think it's a question of which congeners are present in the -- in the particular

materials. I think the congeners that are present in Aroclor 1268 are so -- at such low levels in Aroclor 1254, plus the fact the congener -- that it's not going to change for that reason. Plus the congeners in 1254 tend to be a lot more stable. So they're going to stay there, so it's not going to change as much as a 1242 would.

Q Okay. So 1254 is less likely to weather?

A Absolutely.

Q 1268 is less likely to weather?

A Yes.

Q Okay. So it is not likely that more heavily chlorinated Aroclors after weathering appear to be less chlorinated?

A Only in anaerobic subsediment situations.

Q Okay. Could any of the Aroclors, any of the Aroclors that were produced at the Anniston plant, weather to such an extent that the analytical methods being used to identify them misidentify them as 1268?

A As 1268?

Q Yes, sir.

A Specifically?

Q Yeah.

A If you're -- if you're strictly talking

about Aroclors, probably not.

Q Because of the weathering effect -- and I understand what you're saying about the heavy ends like the 1254, 1260, 1268, but with respect to those lighter ones, the 1242s, for example, are there analyses beyond just Aroclor-specific analyses that can be performed to -- to fingerprint or identify what was it originally?

A In the context of a specific situation, you may be able to do, I mean, some -- what's called fingerprinting, if you're looking for source identification.

Q Yeah.

A You have to have some -- some previous knowledge. Source identification or fingerprinting really depends on knowing what you started with here, what you started with there, and how they contributed to what you ended up with someplace else. Okay? So it can help, but you can't -- it's not something you can do, you know, just out in the -- you know, ab novo. You can't just look at a sample and say it came from that or something that came from that. There's no -- there's no marker in Aroclor 1242, for example, that say it came from Aroclor 1242.

Q Okay. Well, but I guess I need to know what kind of sources or specific situations you're talking about. Are you talking about, you know, was it close to XYZ Foundry, or are you talking about it was in surface soil and it was located, you know, so far from a waterway; that helps me determine it?

A No.

MR. MERRILL: I'll object --

Q (By Mr. Schick) Okay.

MR. MERRILL: -- to the form of the question.

Q (By Mr. Schick) What are you referring to as a specific situation that you have to know?

A Let me think of -- let me describe what I'm talking about when -- when I hear the term fingerprinting, and it may not be the same thing that you're thinking about.

But fingerprinting to me is if you go out in the environment and you have -- you take a sample and you get -- I don't care whether it's an Aroclor analysis or a congener analysis or something. Okay? And you want to know -- okay, I know it's here. I want to know where it came from. Maybe it came from source A or maybe it came from source B. All right?

To really do fingerprinting, you have to

know what the original output from source A was and know what the original source output from source B was and then compare, with concepts of weathering and other things in mind, whether it's more likely than not that the sample you're looking at in the environment came from either A or B. All right?

Q So you're making judgments about what you know about source A versus B?

A Right. You have to -- right. You have to have some foreknowledge of -- of what the source looked like to contribute to that ultimate outcome in the environment.

Q But you can't just take a sample of Aroclor 1254, what you currently say is that's 1254, and say when this thing was originally produced, it was 1242? Can you do that much?

A No. That's -- that's probably as far down the line of what you can't do as you can get.

Q Okay.

A Because when it -- when an analytical chemist -- and this is a source of much confusion and not much understanding. An analytical chemist or computer system, when it does an Aroclor analysis, it's basically doing a pattern recognition. It's looking at the chromatogram.

Q Yeah.
A I assume you've seen chromatograms?
Q Yes.
A It's looking at a chromatogram and the peaks, and it's saying, Okay, to me today this accumulation of peaks looks more like 1254 than it does 1242 or 1248 or 1260. So I'm going to call it Aroclor 1254. But it isn't Aroclor 1254. It's a sample from the environment that looks more like Aroclor 1254 than it does anything else. So you can't tell whether that sample originated as Aroclor 1242, Aroclor 1248 or Aroclor 1254, because --
Q It won't tell you where it's been?
A No. All the things -- all the things that -- that are in there, you know, could have come from any of those things. It won't tell you where it's been unless you have some foreknowledge in a fairly simple system.
Q Fair enough. Tell me which Aroclors have decachlorobiphenyl in them. Is there any besides Aroclor 1268?
A Aroclor 1260 may have some. I'd have to check to be sure, but Aroclor 1260 may have some.
Q If you see a decachlorobiphenyl in a -- in a sample, does that mean that that had to have been

there in the original, whenever it was originally produced; in that original source, in other words?

A Again, I don't know the answer to that. The reason I don't know the answer to that is because combustion processes can create higher chlorinated materials, and -- and I don't want to -- I don't know whether there's any objection to saying the word dioxin or not.

But if you look at -- there's been a lot of work done on it -- on looking at incineration and leading to chlorinated dioxins in the environment, whether it's backyard burning or medical incinerateds or whatever. Well, when you look at that, the bulk of materials you see are the most highly chlorinated dioxins. In that case, there's eight, octachlorodibenzodioxins. All right. And we know it didn't start there.

So in combustion processes, it appears that -- certainly it does more than appears. It's true that you get more highly chlorinated materials through that process. And I don't know the studies that have been done, and I'm not aware of any, but it's certainty conceptual that decachlorobiphenyl could be created. And we know PCBs are created in incineration processes; that decachlorobiphenyl

could be created in an incineration process.

Q Are you aware of any of those incineration processes that took place in the Anniston area?

A Well, since I'm not aware of any studies, I don't know specific -- I can't point you to any specifics. I'm talking right -- to be honest I'm strictly talking conceptually. But I think there are certainly other, you know, sources of deca that could be hypothesized.

Q Other than combustion, though, and looking in the Anniston area, if I see a decachlorobiphenyl, is it more likely than not that the original was -- had contained that decachlorobiphenyl?

A With the -- you know, with the proviso that you say, I think it's more likely than not that it occurred -- it contained it, yeah.

Q Okay. Are there any particular congeners or homologues that are not affected by the weathering process? I mean, we talked a little about --

A Well, it depends on how -- how --

Q It's a continuum?

A -- how low you want to go.

Q Okay.

A I mean, to zero, no. But clearly the more highly chlorinated materials -- once you get to

seven or eight or higher, there's not much going to be going on weathering with those chlorination levels, other than back to our friendly dechlorination in deep sediments. That does seem to occur for some of those.

Q In the Anniston area, is there any particular Aroclor, homologue, or congener that would be a unique identifier for a particular source?

A No, not that I know of.

Q Okay. If PCBs are emitted as vapors during the production process itself --

A Yes.

Q -- would there be preferential emissions of particular Aroclors or particular congeners?

A Well, the emissions at the immediate source, there probably wouldn't be any preferential emission of given congeners. I mean, the Aroclor is going to depend on what you're making. So if you're making 1242, that's what you're going to emit. Or if you're making 1254, that's probably what you're going it emit.

But the congener profile as you move away from that immediate source at the manufacturing site is going to change very, very rapidly depending on

the congeners, because as we discussed earlier, the more heavily chlorinated are going to condense faster. They're going to -- you know, all those things that determine their environmental mobility are going to start kicking in. So they're going to -- the higher chlorinated are going to be removed from that profile a lot more rapidly than the lower chlorinated materials which are more likely to remain in the vapor phase.

Q And those that remain in the vapor phase, it's the lighter homologues that are going to remain in the vapor phase for longer?

A That's generally correct, yes.

Q We talked a little bit earlier about the fact that PCBs that are released into the environment and end up in soils can -- can -- they can actually migrate back into the atmosphere, be blown. I mean, we talked about that in connection with the Arctic.

A At very low levels, yes, correct.

Q That would also be true of, say, the floodplain where a flood occurs that washes PCBs out of a waterway onto a floodplain; and when it dries out, those PCBs attach to particulate matter; if sufficiently dry, could be picked up by the wind?

A At some level, yes.

Q Okay. My colleague here is a lot smarter than I am. Asked me to ask you this follow-up.

A I noticed. Not that he was more smarter than you. Just I noticed he asked -- he wants you to ask this question.

Q Trust me. He's smarter than I am.

MR. LIPPARD: I'm nowhere close to as smart as Bob is.

Q (By Mr. Schick) When decachlorobiphenyl is created during combustion -- you were talking about combustion -- what particular materials have to be present to create a heavier chlorinated homologue?

A Well, again, I'm going to -- I'm hypothesizing to a certain extent, but I'm going to go back to my dioxin experiment and my dioxin knowledge; and it is that you have to have carbon and chlorine and heat. If you have a combustion system where you have carbon, chlorine, and heat, you're going to generate dioxins and presumably PCBs.

Q Can PCBs present in surface waters of a waterway be lifted into the air?

A Yes. There is -- again, we're talking about very, very small amounts, but there is an

interchange between air and water -- dissolved PCBs in water and the air, yes.

Q Okay. And is that through volatilization, or is it either volatilization or through attachment to a particulate that just gets picked up?

A Well, I'm -- well, I think in the case you're discussing, it's going to be volatilization. I mean, because otherwise -- I don't -- I don't know other than if -- if you're in a hell of a storm, I guess you could have particulates spewing into the air, but in a quiescent lake situation, it's going to be volatilization.

(Defendants' Exhibit Kaley 2 marked for identification.)

Q (By Mr. Schick) Let me hand you what I've marked as Exhibit 2 to your deposition. And just to sort of set the stage here, this is a December 19, 2005, letter that was sent to the EPA.

I assume you've seen this before?

A It's possible but I don't know whether I have or not, frankly.

Q I just want to ask you about a couple of questions here. Turning to page 4.

A Okay.

Q There's a statement that, Because of the

physical properties of PCBs, low volatility --

A I'm sorry. Where are you?

Q I'm sorry. I apologize.

A I'm going to try to look at my document.

Q Yeah, you're really better off doing that.

A I'm with you. I found it.

Q Because of the physical properties of PCBs, low volatility at ambient temperatures, essentially all of the PCBs discharged from leaks or vents in the process would condense close by in the manufacturing facility itself.

Do you agree with that statement?

A Yes.

Q And is that saying that PCB vapors can't condense onto particles or particulates that keep them suspended, or is this just vapor?

A I think it's both. And it says essentially all. It doesn't say all. So I mean, clearly a molecule or two -- and I'm exaggerating in the other direction -- could -- could remove from the site. But I agree that essentially all of the materials, no matter what the chlorination level or the dust, are going to drop out very close to the -- in the manufacturing facility itself.

Q Have any --

A Because they're being emitted at elevated temperatures. And as soon as they get to the ambient temperature, all those processes are going to kick in.

Q And we talked about the filming. Is this where you're going to get that filming, the condensation?

A Sure.

Q Have any studies been done to determine the extent to which when condensation occurs, how quickly and over what area?

A Not that I'm aware of.

Q So -- and you acknowledge that you were going in the other direction when you said a couple, you know, one or two molecules can get off. You really don't know how many might continue moving for a greater distance?

A No. But it would be a very small number compared to a pure Aroclor fluid.

Q And certainly PCBs are going to be more volatile at elevated temperatures?

A Yes.

Q And that's true regardless of how highly chlorinated they are?

A Yes.

Q Take a look at page 10, if you would, please.

A (Witness complies.)

Q Says, Figures 4 through 7 in the NewFields memorandum all indicate that a PCB mixture with a dominant Aroclor 1268-like pattern not only exists in the soils near the former Monsanto facility, but also in soils elsewhere in Anniston.

A Yes, I see that.

Q And do you know what that 1268-like pattern is referring to?

A I believe I do.

Q What -- what -- what do you understand that to be referring to?

A In some of the samples that have been taken in the Anniston area, there are a group of congeners in the 8, 9, and 10 level of chlorination that have been seen and reported as Aroclor 1268 in some of those samplings.

Q A little further on it says, Therefore, they would not be preferentially transported with distance through the air.

What does preferentially transported mean?

A I'm sorry. Where are you again?

Q I'm sorry. It's in the next paragraph,

starting with the word therefore.

A Okay. All right. I'm sorry. What's your question again?

Q My question is: What does that mean, preferential transfer --

A Well, I mean --

Q -- or transport?

A -- I'm not the writer, but I assume it means that it's not more likely that the heavier chlorinated materials are -- there's no reason that the heavier chlorinated materials would be transported more efficiently or farther or anything than other lower chlorinated materials.

Q Okay. But that's not to say that Aroclor 1268 doesn't -- isn't capable of being transported?

A Well, yeah, it doesn't say that. But, I mean, again, because of all the things we've talked about this morning, it's Aroclor 1268. And again, I'm going to say Aroclor 1268-like congeners are going to move very, very slowly compared to other materials.

Q Certainly with respect to vapors, but with particulate matter they can move --

A Right.

Q -- like others?

A Exactly. That's correct.

Q And by the way, what Aroclors would the 8, 9, and 10 chlorine congeners be located in or be present in?

A Well, there's certainly some in Aroclor 1260. I don't recall whether there's some in 1254. There probably are small amounts. But anything higher chlorinated than 1260 certainly is going to have some of those congeners.

Q Okay. And we do know that 1268 can travel through the air as well? I mean, that was noted on the tree bark.

A Well, okay. I understand that that has been reported on tree bark, assuming that those analyses were done correctly and they stand for what they purported to stand for. It appears that there was some mechanism to get them to that tree bark, whether it was by volatilization or dust, yes.

Q Okay. I want to turn now to page 16. And there's a discussion in the middle paragraph on this page about an EPA analytical Method 8082. Are you familiar with that?

A Yes.

Q Do you -- do you believe that that method can be used to identify Aroclor mixtures present in

the environment; that is, Method 8082?

A I believe that that method can be used to report as Aroclor mixtures the presence of PC -- certain PCB congener -- certain PCB mixtures in the environment. It is -- again, I think we discussed it's -- the computer is looking at the sample, the results of the analysis, and saying it looks more like this than it does any of the other Aroclors. So it certainly reports them out as Aroclors. So it certainly reports them out as Aroclors, but it is not identifying them or saying they are that Aroclor.

Q And in fact the last sentence here says, The identification of a particular Aroclor on chromatogram is an analytical tool, not a true identification.

A I agree with that statement. I'm not sure I would use those words, but I agree with the import, the impact, of that statement.

Q And in fact this is the same technique that Monsanto has used in identifying Aroclors in the Anniston area, true?

A For some of their samples, yes.

Q Okay. Well, I mean, are there -- are there other techniques that have been used besides this

methodology?

A There's been some congener -- this is not congener-specific analysis.

Q What congener specific --

A I mean, it's not -- well, it is a congener-specific analysis. I don't want to say that. It is -- it's not as congener specific as some others, but it's -- it does do a fairly good job of separating. But it's -- but the point is that the results are not reported by congener. They are reported by Aroclor.

Q Right. What more specific-congener analysis has been done by Monsanto or Solucia in Anniston?

A Well, my -- I'm not sure. My understanding is there have been some that just report what the particular levels of the congeners are. So, for instance, it's so much 125; it's so much 137; it's so much 196. Rather than trying to characterize it as an Aroclor. Because these things out in the environment -- and we're back to weathering. They're no longer in general Aroclors, unless they're recently emitted. They're not Aroclors. They're the result of a complex longtime effect of weathering on these materials. And they look like something, but that doesn't mean they are that

thing.

Q Right. They're just a mixture of some congeners?

A Right. And they look more like one Aroclor than another. That's all the computer is looking to say. It looks more like this than it does that.

Q And then we have to apply our judgment with respect to what we know about a specific situation and the AB example that you gave later in order to get to any kind of a source supposition?

A If that's what you're trying to do, yes. I mean, in general -- I know I'm not supposed to answer questions that weren't asked. In general the purpose of all these analyses was to measure the total amount of PCBs were there, not to identify which Aroclors were there. So that's why that method was used. It was used to get a total PCB count, and just that's how the method reports it out.

Q If you would turn to page 19 of this Exhibit 2. And up at the top of the page, we have some historic Anniston Aroclor production percentages of the various Aroclors.

Do you know whether that's accurate or not? Have you ever looked at that?

A It roughly comports with my understanding, but I haven't necessarily looked at it nor compared it to the source materials to see if it's true or not. It makes sense.

Q Okay. And then if you'll look at what I've highlighted here in that paragraph beginning in the middle of the paragraph, Even accounting for severe weathering that could have eliminated lower chlorinated PCB homologues, it is not physically, chemically, and biologically feasible for selective weathering of the higher concentration Aroclor 1254 and 1260 components to be less dominant than Aroclor 1268. Instead profiles heavily weighted with PCBs that resemble Aroclor 1268 are indicative of a specific source not related to emissions from the ongoing manufacturing process that occurred during approximately 44 years of production.

Now, what does it mean when we talk about it is not physically, chemically, or biologically feasible for selective weathering of the 1254 and 1260 to be less dominant than 1268?

A Well, I think it goes back again to an earlier discussion we had that -- and I think specifically I was asked could Aroclor 1254 weather to 1268. And I think -- or to something that looks

like Aroclor 1268. And I think the answer is no because by the time you get up to 54 and 60, the primary dominant congeners in those mixtures are going to stay put, too. You're not -- you're not going to get rid of them. You're not going to push them down so far that what looks like 1268 pops up.

Q So 1254, 1260, and 1268 are going to remain looking like 1254, 1260, and 1268?

A Pretty much so, yes. I think that's pretty consistent with what's been seen throughout the world.

Q This letter also, because we saw that at the top of this page you have the listing of production over time, kind of makes the assumption that concentrations in the environment would be roughly proportional to what was actually produced at the Anniston plant. Do you agree that that's the case?

MR. MERRILL: I object to the form of the question. I'm not sure it adequately characterizes what the letter says.

Q (By Mr. Schick) Let me ask you this. We're looking at the top of page 19 of Exhibit 2, Aroclor production over time. Is it your view that what is found in the environment should look similar in terms of percentages in Anniston to what was

actually produced at the plant?

A No.

Q Okay. And that's because we've got weathering?

A That's correct.

Q And so we would expect to see, from the Monsanto plant itself, a lot more of the 1254, 1260, and 1268 than was actually produced at the plant?

A More of 1254 and 1260 possibly. Again, I think the 1268 question goes back to what we answered before. I don't think you're going to see that pushed up for two reasons.

Number one, it was present at very low levels anyway, apparently based on this chart. And No. 2, the 54s and 60s aren't going to change enough to make that any kind of a predominant congener mix. So I would think they're going to look mostly like somewhere in the 48 to 54 to 60 range which is what you see everywhere else in the environment throughout the country and the world really, because it's kind of an averaging process.

Q If you take a look at page 21 of Exhibit 2, a discussion goes on about, NewFields argues that there was a large amount of PCB losses to the atmosphere. And then the reply is, This statement

is erroneous. Subsequent calculations are erroneous. And then the sentence reads, The error comes from a memo dated January 18, 1971, from a retired employee of former Monsanto, Mr. L.G. (sic) Wright.

Are you familiar with Mr. Wright's calculation and what he did showing that PCB concentrations were present in the air near the PCB production process?

A I've certainty seen it. I know what you're talking about. I don't remember the details.

Q But you wouldn't disagree with the fact that PCBs in the air can remain suspended for some certain -- some length of time under certain circumstances?

A Some small amounts at the points where these measurements were taken possibly would not have condensed immediately and could be moved. It's -- I don't know what the amounts were. And I don't -- I don't know really -- this is -- obviously this is based on a NewField statement, and I don't remember the context under which they made that statement.

But I don't think there would be -- to the extent you're talking about atmosphere, meaning off the plant site, I think that large -- it is not

possible that large amounts of PCBs would be contributed to the atmosphere based on those -- those measurements, again, because they're right at -- as I recall, they're right at leaks or source emissions to the atmosphere in a heated manufacturing process, and those levels are not going to be maintained for any distance whatsoever away from that manufacturing process.

Q And, again, it's hard for you and for me to discuss intelligently the quantification because we don't know what we're starting with?

A Absolutely. You're absolutely correct.

Q We don't know what our temperatures are. We don't know what our wind speeds are. And those are all factors that go into this, right?

A I would agree with that.

Q But we do know, as we discussed earlier, that once vaporized you've got the condensation possibility that's going to happen at some point, and you also have the possibility either before or at condensation attachment to particulate that may spread that molecule beyond the plant site?

A Yeah. In the context of these particular measurements, I think the particulate movement is less likely, I mean, because you're right in the

process. I don't think there's going to be a lot of particulates there. But to the -- you know, again, to the extent that they deposit on soils and were later moved by wind, some amount is possible.

Q Do you know about any studies done over time about the amount of particulate matter in the air around Anniston and in particular the Monsanto plant?

A Not specifically. Although -- well, I don't know. I think when some of the air measurements were done, they actually tried to discriminate between PCBs on particulates and PCBs in air. But that discrimination is -- is questionable at best. So I don't know whether anybody tried to quantitate the particulates at that time or not.

Q You recall that you gave an affidavit -- you've given several affidavits. You gave an affidavit, though, in connection with Solucia's 104(e) response?

A Yes.

(Defendants' Exhibit Kaley 3 marked for identification.)

Q Let me show you a copy of if. I've marked it as Exhibit 3 to your deposition.

A So it was an exhibit? It wasn't actually an

affidavit in the --

Q Yeah, it was an exhibit to the response.

A -- in the response? It was an exhibit to the response. Yes, I'm familiar with this affidavit.

Q Okay. And I want to direct your attention to page 23, paragraph 37.

A Okay.

Q And the affidavit that you provided described some air sampling that was conducted by Solucia, true?

A Yes.

Q And this particular paragraph, No. 37, explains that PCBs were detected in the ambient air at the Mars Hill Missionary Baptist Church?

A Yes.

Q Do you know; from having been there before, where is the Mars Hill church located?

A It's properties just east of Monsanto.

Q Okay. And certainly you agree that the levels that were identified there in 1998 or 1999 were certainty higher than background, true?

A Yeah. I could say 80 nanograms per cubic meter is higher than background, yes.

Q Okay. So -- so in this -- this is an

instance we have in which PCBs can be present in ambient air, correct?

A Yes.

Q And would you say that the likely source of those PCBs was the Monsanto plant itself, just west, I guess, of the Mars Hill's Missionary Church?

A You mean at the time the measurements were taken?

Q Yes, sir.

A No. I would think it's probably surface interchange and contaminated soils in the area of that particular church.

Q So the PCBs might have come from Monsanto years earlier, but they were deposited in soils and picked up by the atmosphere, and that's what's being read in '98 or '99?

MR. MERRILL: I'll object to the form of the question.

Q (By Mr. Schick) Is that what you meant?

A Basically, yes.

Q Okay. How -- when I say basically, my wife --

A Well --

Q -- always says --

A I'm sorry.

Q -- what did I get wrong about that?

A Yes, yes. I'm sorry. I shouldn't have said that. You're absolutely correct. That is correct. That is my -- my understanding of that level would have been that it's from PCBs that were in the soils in the general area of the church and were not being wafted over from the existing Monsanto facility in that time frame.

Q Sure. Because this is 20 years after production has ceased, right?

A Yes. Well, almost 30, yes.

Q Right. Do you know whether the air sampling that was done there made any attempt to analyze specific congeners or homologues?

A I'm 99.9 percent sure it was reported as homologues. If this is our -- I don't remember whether this is our sampling or --

Q I think it says --

A -- the plaintiffs' sampling.

Q I'm sorry. It says, The results of air sampling --

A Conducted by Solutia.

Q -- conducted by Solutia.

A Okay. So in that case the reports were reported by homologues. So there would have been a

congener-specific analysis that was reported after the congeners were grouped into homologues. So, yes, it was reported by homologues.

Q So when you refer to an Aroclor here in the paragraph, you're just guessing -- you're just saying it most resembles or the homologue mixture most resembles Aroclor 1242?

A No. All I'm saying is the OSHA PEL for PCBs of lower chlorinated materials is based on Aroclor 1242, and that's what that PEL is.

Q I'm sorry. I misread it.

Do you know where the results are reported?

A Do I know where the results are reported?

Q Yeah. The homologue results, because they're not reported in this paragraph.

A Well, they're reported in a -- in one of a number of reports from the company that was doing the air analyses for Monsanto in that time frame.

Q Which one; do you know?

A ENSR, I would guess, E-N-S-R, all caps. Would be my guess they were the ones doing it.

Q Okay.

(Defendants' Exhibit Kaley 4 marked for identification.)

Q (By Mr. Schick) Speaking of which, let me

show you Exhibit 4 to your deposition which is from ENSR dated July of 2004.

A Okay.

Q You've seen this before, have you not?

A I'm not sure whether I have or not.

Q Oh, is that right?

A This was after my retirement, and I may or may not have seen it. So I don't know.

Q Okay. By the way, meant to ask you. Forgot. What did you do to get ready for your deposition here today?

A A conversation with Charlie on just general -- make sure I understood what the parameters of my presentation were and possible areas for -- for questioning.

Q Did you review anything, look at any documents, pick up anything?

A I skimmed my old depositions in this case. And I didn't -- I clearly didn't read them. I just leafed through them to see if anything jumped off the page. And then I did review some -- some depositions, parts of depositions, from other -- Jerry Brown and others.

Q Okay. That's it?

A I think I did -- I think there was one

analytical method that -- on measurements of PCBs in air that Charlie asked me to take a look at.

Q Which one was that?

A It was an old method from -- I don't even know when it was. It was undated. So, I mean -- but it was a very old method for measuring Aroclors in air that really wasn't measuring Aroclors in air. It was measuring chloride. So I just looked at that. He thought that might come up.

Q Okay. Was that it?

A Yeah, that was it.

Q Okay. Did you talk to anybody other than Charlie or any other lawyer for Solucia --

A No.

Q -- in getting ready for your deposition?

A I'm sorry. No.

Q Okay. So let me ask you to turn to page 4-9 of this report.

A Okay.

Q This comes under a heading Identification of PCB Source Locations; do you see that?

A I do.

Q And it says, In addition to off-site influences, the data also suggest influence from onsite PCB source areas. During one session -- and

they reference November 17, 2003 -- two monitors downwind of the facility showed the highest PCB concentrations. A second session, which is September 10, 2003, showed PCB concentrations increasing across the plant along the upwind/downwind vector.

Do you agree that the Solucia facility remains an ongoing source of PCBs to the atmosphere, even as of 2003?

A Well, again, I don't -- I don't know where these samplers were located. So I don't know whether they're onsite or offsite. And again, so apparently wherever these were based on this paragraph, which says what it says, that there were evidences of higher levels of PCBs consistent with that being -- you know, being a source on those particular days.

Q And there can certainly be a source of PCBs on the -- on the Monsanto property there in Anniston if PCBs remain in any of the surface soils and get picked up by -- by wind?

A Yeah. Again, that's a reasonable -- I don't know the levels. I don't know what we're talking about here. So I don't know whether the question of significance comes into it. But based on -- on this

particular paragraph, I would say that that's a fair inference.

Q Okay. And it would also be a fair inference, would it not, that to the extent there is any sign of some PCBs being generated in the downwind concentrations, as they are there, those concentrations would have been heavier when production was actually ongoing --

MR. MERRILL: Object to the form of the question.

Q (By Mr. Schick) -- back in the '60s?

MR. MERRILL: Object to the form of the question.

A Yeah, I -- I was going to give you a smart answer. I won't.

Q (By Mr. Schick) More likely than not?

A It's possible, yeah. We don't know, but...

Q But it's certainly more likely than not that they would have been?

A Yeah. But, again, I don't know where these samplers were, whether they were places that were right next to where the facility used to be or whether they're, you know, on the other side of Anniston. I just don't know. So it's hard to say what impact that would have off the plant site. I

mean, clearly if you're measuring PCBs in the air at the site of manufacture, they're going to be higher levels than other places. So I just don't know the answer.

THE VIDEOGRAPHER: Excuse me, Counselor. We have four minutes of tape.

Q (By Mr. Schick) Have you ever estimated fugitive air emissions from an industrial process?

A Me personally?

Q Yes, sir.

A No.

Q We talked about the Hermanson tree bark report earlier. And you said -- you told me what you understood it to reflect and then told me that there were -- assuming analytical something or other and something else -- the record will reflect what you intelligently said as opposed to my dim recollection.

A That's fine.

Q And I just wanted to follow up with that.

(Defendants' Exhibit Kaley 5 marked for identification.)

Q (By Mr. Schick) This is Exhibit 5 to the deposition. And you see right there in the -- in the abstract the last sentence says, We believe that

high-temperature Montar disposal released high molecular mass PCBs into the gas phase which were dissolved into older tree bark lipids.

And that was your understanding of this report, correct? We talked about how would -- how would PCBs get to tree bark 5 miles downstream, and you mentioned on dust particulates or vapor phase, I thought.

A Okay. I'm not sure how that relates to the sentence you just read, but...

Q Okay. Well --

A My understanding is that the conclusion that that sentence is based on are trees that were basically on the landfill.

Q Okay. But he also took a look at trees down like 5 miles away; you know that?

A Yes.

Q And you know that that is -- that he did identify PCBs in tree bark 5 miles away from the plant?

A Yes.

Q Now I need to know what criticisms you have of the analytical method he used or the conclusions he drew, if you have any.

A I don't know that -- I don't know that those

relates to the procedure. There are several things.

Number one, I never seen -- I have never seen any analytical method validation from his -- his laboratory that he uses. Maybe it exists, but I haven't seen it.

Number two, a lot of his results are based on lipid-based analyses of tree bark and the lipid levels -- do you want me to stop? The lipid levels in tree bark are vanishingly small so there's a huge room for error there. I'm not necessarily questioning whether PCBs were measured in that -- on that tree bark. But it's possible that you could go outside this building and find PCBs on tree bark. So it's really the interpretation of the results.

And for this -- I got to say this: The sentence you have highlighted, I think, is a total misunderstanding on his part on how Montars are disposed.

MR. SCHICK: Okay. And we'll come -- when we get back on the record, we'll talk a little bit about Montars. Thank you.

THE VIDEOGRAPHER: We're off record at 11:19. This ends tape two.

(Off the record.)

THE VIDEOGRAPHER: We're back on record at

11:28. This begins tape three of the deposition of Dr. Robert Nelson.

MR. SCHICK: Dr. Kaley.

THE VIDEOGRAPHER: Excuse me.

Q (By Mr. Schick) That's okay. Dr. Kaley, when we took our break, we were looking at Exhibit 5 of your deposition, this report from Dr. Hermanson and Johnson and this sentence you pointed out to me that I actually highlighted, We believe that high-temperature Montar disposal released high molecular mass PCBs into the gas phase which were dissolved into older tree bark lipids. And you said you thought he didn't understand the Montar disposal method.

Would you tell me what you mean by that?

A Okay. I've --

MR. MERRILL: I'm going to object to the question only to the extent that it is really testimony that's beyond the scope of the 30(b)6 designation. And he may certainly go ahead and answer it, but the answer is not necessarily being offered as 30(b)6 testimony.

MR. SCHICK: Fair enough.

A All right. I've heard Dr. Hermanson speak a number of times and in addition have read his

publications, and my understanding is that when he wrote this, he believed that PCB still bottoms were trucked up to the landfill in a hot state and dumped out of those containers into the landfill and that was releasing these high molecular mass PCBs.

And number one, I've never seen anything which substantiate that method of disposing of PCB still bottoms. And number two, it's my understanding, I think at least, that even Dr. Hermanson has recognized that his original assumptions were not correct.

Q (By Mr. Schick) Okay. So we'll come back to Montars in a second, but whatever he found in those tree barks, you're saying, didn't come from Montars. It came from some other vaporization or particulate methodology or mechanism?

A To the extent that they were correctly identified in there, yes, I agree with that.

Q All right. Now let's talk about Montars a minute. There -- as I understand it, there are at least 10 Montars. Maybe there are a whole bunch more. And you've spoken in other depositions about the nonchlorinated Montars, the still bottoms that would come from the biphenyl process, the benzene through the lead pot process making biphenyls.

And as I understand it, the still bottoms or Montars from that process were -- were referred to as Montars 9 and 10?

MR. MERRILL: I'm going to object to the form of the question, again for the -- for the same reason. Can I have a running objection to the questions on Montars?

MR. SCHICK: Absolutely. But what I do intend to get to, though, Charlie, and what I want to be asking Dr. Kaley about is the possibility of emissions either through air, water, soil of Montars 1 through 8.

MR. MERRILL: I figured you might bring it around. And I wouldn't --

MR. SCHICK: Right.

MR. MERRILL: -- object to it when you get into these topics. But I didn't -- since I don't know where you're going, that's why I wanted to --

MR. SCHICK: Fair enough.

MR. MERRILL: -- raise that objection.

MR. SCHICK: Fair enough. That's okay.

A All right. As I sit here today, I don't know which were which. So if you know you're right and we can assume that you're right, I'll try to answer your questions. But I don't -- without

seeing a list of Montars and what their source was, I'm uncomfortable talking about individual Montars.

Q (By Mr. Schick) Fair enough. There were Montars, regardless of numeric designation, that came about in the chlorination process that were the still bottoms after the chlorination process, true?

A That is true.

Q Okay. And I don't believe you've been asked this before, and that's why it was important to me to ask you this. What was the process for disposing of the Montars generated in the chlorination process; that is, Montars that would contain chlorinated biphenyls?

A My understanding is that they were drummed at the site of the distillation columns and then transported to the landfill.

Q In the drums?

A In the drums. In sealed drums.

Q And not poured out into the landfill?

A That's correct.

Q Now, is it also correct that when those Montars were poured into the open drums at the facility, that they were at 300 degrees or so?

A I don't know the temperatures. If you -- if you eventually have a source that says that's the

temperature, I'm not going to disagree with that. I don't know the temperature.

Q Do you know that in the process they would have been poured out while still hot?

A Oh, they were hot. I'm not arguing whether they were hot or not.

Q And is it also a fair description of the process that the drums would not have been covered until after they had cooled somewhat?

A I don't know.

Q You just don't know the answer to that?

A I just don't know.

Q All right. Now, is it -- do you -- well, if Montars from the chlorinated biphenyl process were placed in drums at a higher temperature well above ambient, there would have been vaporization taking place off those -- off the tops of those Montars, true?

A To some extent or another, yes.

Q And we'd have the same kind of vaporization going there that we have from any other process around the plant as we've discussed, true?

MR. MERRILL: I'm going to object to the form of the question.

A I'm not sure what you mean. But, I mean,

vaporization is vaporization. So, I mean, to the extent we've talked about the higher chlorinated materials are going to drop out faster and condense faster are much less likely to be transported any considerable distance, yes.

Q (By Mr. Schick) Okay. And then, of course, after landfilling, if those -- if the integrity of those drums was somehow compromised, water could pick up those Montars and they could be released in the environment, true?

A I don't believe that could occur at a measurable -- those things are solids. I mean, they're basically a solid mass. So to the extent that any water -- you know, assuming they were punctured, which obviously I don't have any evidence they ever were, I don't think very much would -- measurable amounts would be picked up.

Q Okay. In the west -- it was the west landfill that Alabama Power had for a while, right?

A That's correct.

Q And didn't they do some grading and digging at some point?

A Yes.

Q And they punctured some drums in the process of doing all that, didn't they?

A I'm not -- I don't recall whether they punctured drums or whether just stumbled on some basically semisolid materials. I don't recall whether it was a drum puncture or not. I don't -- as I sit here, I don't think it was. But clearly they did by one mechanism or another uncover some semisolid materials.

(Defendants' Exhibit Kaley 6 marked for identification.)

Q (By Mr. Schick) Dr. Kaley, let me show you what I've marked as Exhibit 6 to your deposition, and so you know, this comes from Exhibit 14 which was the EPA Exhibit No. 14; and this is just one page from the document that I pulled out. But it talks about Aroclor collection and disposal of chlorinated Montar, amount of wastes, 1971, and it shows Montar 1 million pounds per year, Montar 1; Montar 5, 10 million pounds per year.

Do you know one way or another whether those look to be accurate figures?

A No.

MR. MERRILL: And, again, I'm going to object to the -- this line of questioning as being outside the scope of the designation.

A And I have no idea.

Q (By Mr. Schick) Assuming that any of those solid Montars did find their way into the environment in waterways or in sediments, it would certainly be possible for them to be transported in the same distances as any other PCB once entrapped in sediment, true?

MR. MERRILL: I'm going to object to the form of the question.

A All right. That's a mighty big assumption, because as I said, the physical state of those Montars is not conducive to them either themselves breaking up into small particles or any measurable amount of chlorinated material somehow being separated on a molecular basis and re-adsorbing to soil. So having said that, if what I consider to be either of those very unlikely occurrences occurred, then they would be moved, yes.

Q Okay. By the way, I had understood that there was a clay-like material that was used to filter PCBs after -- in the chlorination process after the reaction of the biphenyl with chlorine under heat and, I think, the presence of a catalyst.

What happened to that clay that was used?

A My understanding is it was drummed and landfilled.

Q Okay. In the same way as Montars?
A Well, the same ultimate outcome, not the same way. But yes.
Q Sure. Because it wouldn't be hot?
A Right.
Q And that clay would have contained PCBs, true?
A Yes.
Q And it's your understanding that was also placed in drums and taken to the landfill?
A Yes.
Q Do you have any idea what kind of volume we're talking about of that clay?
A Not really.
Q Would it be in the same mag -- order of magnitude as the Montars?
A I have no idea.
Q Okay.
(Defendants' Exhibit Kaley 7 marked for identification.)
Q (By Mr. Schick) Exhibit 7 to your deposition is -- I'm sorry.
A I'm sorry. I just didn't reach for it. No, that's fine.
Q -- a study that was done in a different

location, but what I want to ask you about is on page 1231 of this document.

A Okay.

Q And I believe this was done of the Sauget facility. You're familiar with the Sauget facility --

A Yes.

Q -- of Monsanto's?

A Yes.

Q It says, Referring again to Table 1, the higher PCB concentrations are apparently at points closer to the facility with concentrations generally decreasing with increased distance.

That's your belief with respect to airborne transport of PCBs, true; that it's -- the concentrations decrease with increased distance?

A Yeah. That -- that comports with my understanding of how air transport would occur, yes.

Q The next sentence, This distribution suggests airborne transport of the PCBs, including decachlorobiphenyl, from the manufacturing facility, with subsequent deposition onto the surrounding landscape.

Do you have any reason to disagree with that conclusion?

A The only reason I would disagree with that conclusion is that decachlorobiphenyl or Aroclor 1268 weren't manufactured at Sauget after about 1958. So I doubt -- I would really question the results with regard to decachlorobiphenyl.

Q Okay. Do you know who --

A In fact, I think it's 1948 actually.

Q Do you know who did this study?

A No. I'm not -- I'm embarrassed to say I'm not sure I've ever seen this study.

Q Okay. Okay. Fair enough.

A Can I have a copy to take with me?

Q Sure. Yeah, I'll give you -- I'll give you mine.

On the preceding page, here's this table that they referred to.

A Yes.

Q Oh, you know, it says of the -- no. It's the same place, right. Table 1 lists distance from the facility in meters, and then it has Aroclor 1242, 1260, decachlorobiphenyl, then total PCBs.

A Yeah.

Q And I just -- the way I read this: It showed that there were 1.6 decachlorobiphenyls part per million picked up 1050 meters or just over a

kilometer from the facility. Is that how you would read that?

A Yes. But it doesn't say it came from Monsanto.

Q Understood. Understood. Although that --

A I mean, I just -- like I say, that whole finding doesn't comport with my understanding. And why would it be higher farther away than it was closer? It doesn't -- if you look, the Aroclor 12 -- decachlorobiphenyl doesn't fit the pattern of the other Aroclors. For the other Aroclors, the highest are 250 and 400 meters, and here it's, you know, 1050. And I -- that -- that's entirely inconsistent with my understanding of how the whole system works.

Q Could it be that the decachlorobiphenyl attaches itself to particles that somehow wind up being transported by air more?

A Why would those particles be transported further than particles with any other Aroclor?

Q By the way, you personally haven't ever done any air deposition modeling, I assume? That's not an area of your expertise?

A That is a fair assumption.

Q Okay. And you haven't actually done any of

that kind of air modeling?

A Not officially no.

Q Done it unofficially?

A Well, I've thought about it. I haven't done it officially. I haven't plugged it into a model. I thought about what a model ought to look like.

Q Okay. But you haven't designed and haven't been asked to design and haven't talked to experts about designing one?

A You're correct.

(Defendants' Exhibit Kaley 8 marked for identification.)

Q (By Mr. Schick) Let me hand you what's been marked as Exhibit 8 to your deposition. And this is an old one. Appears to be 1935 diphenyl and chlorinated diphenyl derivatives, diphenyl being just a synonym for biphenyl, true?

A Yes.

Q And this report talks about Aroclor No. 1269. And the first sentence there says, Aroclor 1269 is the product distilled from chlorinated diphenyl with a chlorine content of 69 percent.

So we know it's talking about the same kind of percentage we've always talked about with respect

to PCBs?

A Yes.

Q Are you familiar with 1269?

A I mean, I know that it was manufactured at some low level or another by Swann. I'm not -- I don't think it was ever manufactured by Monsanto. I mean, this is a Swann document. It's not a Monsanto document.

Q I see.

A I think.

Q This is before --

A Well, it was right at the -- it was right at the cusp when Monsanto was purchasing Swann. So maybe it is a Monsanto document. I don't recall. But it's -- it's basically from the Swann era. I'm not aware that 1269 was ever manufactured by Monsanto, at least after -- much after this time.

Q But it may have been manufactured by -- at least at the Anniston facility? I mean, that's what this demonstrates?

A Right.

Q Perhaps before Monsanto purchased it?

A Right. I don't disagree with that.

Q Then there's discussion on page -- if you look up at the top right-hand corner, a handwritten

41.

A Okay.

Q And it says, The room housing this equipment should be well ventilated both because the stills are hot and as an extra safeguard against dust. Operators in contact with such dust may develop a severe form of dermatitis.

And I think you've testified in previous depositions that dermatitis is a known human reaction to contact with PCBs?

MR. MERRILL: And, again, I'm going to object to this line of questioning to the extent it's beyond the scope of the 30(b)6 notice or designation.

Q (By Mr. Schick) But did I get that part right?

A Generally, yes, it can be.

Q Okay. And -- and are you familiar with the fact that the manufacture of 1268 created dust?

A 1269?

Q I'm sorry. 1269.

A Well, to the extent that it says so in this document, yes.

Q Okay.

A I have no reason to doubt the document.

Q And then the next paragraph or the last paragraph there says, Another factor complicating operations is the sudden decomposition that occurs at the end of the distillation. The gas evolved contains large amounts of acid-forming vapors and also some of the Aroclor 1269 as an extremely finely divided dust which is discolored and decidedly acid. Efforts made to collect this dust and rework it have not been successful. Our operations at present are to discharge these decomposition products through an exhauster and into the atmosphere. Such a procedure in a more populous community might create a nuisance.

Have you seen this before today?

A Yes.

Q Are you familiar with this dust and how it was exhausted into the atmosphere?

A Not -- nothing over and above what it says here.

Q Do you know what volumes of this dust that's referred to in Exhibit No. 8 were discharged into the atmosphere?

A No.

Q Do you know over what period of time 1269 was manufactured?

A Well, as I said before, I'm not aware of it being manufactured after the date of this document. I don't know when it stopped or started, but I don't know specifically.

Q The -- if you turn to the last page of the document, they're talking about what they can do to collect this material. And they say, The material is acid and the fineness of particles approach that of fog particles.

And those would certainly be particles that could be picked up by -- by air and sent some distance if we knew more about its weight, etc., true?

A That's -- that's a fair inference, yes.

Q Do you know anything about a fire occurring in the drumming and flaking Aroclors facility?

A Just a little bit.

Q What do you know about that?

MR. MERRILL: Again, I'm going to object to the question to the extent it's beyond -- and of this line of questioning to the extent it's beyond the scope of the 30(b)6 designation.

A Not much other than I think it occurred and I think it was just -- I think it was diphenyl. I don't believe it was chlorinated diphenyls.

Q (By Mr. Schick) Okay. It's your understanding it was die -- it was -- it was not chlorinated?

A I don't know what you're looking at, but it seems to me there's a document that says the diphenyl flaking operations. So that's my recollection.

Q Similar question. There's been testimony about pumping of Montars into Cleghorn Lake. Do you -- but it may have been with respect to biphenyl Montars. Do you know whether chlorinated Montars were ever deposited in any waterway?

A Well, Cleghorn's Lake wasn't really a waterway. Cleghorn's Lake was a disposal pit on the Monsanto Anniston plant site. It was called a lake more as a light-hearted joke than anything else, first place. Second place, my understanding is those were all nonchlorinated Montars. They were from the polyphenol manufacturing process.

(Defendants' Exhibit Kaley 9 marked for identification.)

Q (By Mr. Schick) Let me give you Exhibit 9 to your deposition. This is a memorandum from Mr. Papageorge. Do you know Mr. Papageorge?

A I do.

Q And it's dated August 17 of 1970. And he talks about an inspection in Anniston that he did, and he said, I was, however, disappointed that we are still using considerable quantities of sand to keep the floors in the department partially dry.

At the bottom of that page, he says, I have concerns regarding the containment of Aroclors from the bulk storage, drumming, tank car and tank truck loading areas. The amount of Aroclor on the drumming area floor appeared excessive and could overload the small sump which is in the present drainage channel from this area.

My question to you is: Does this demonstrate another way in which Aroclors could either find their way into a waterway or onto soil and the atmosphere?

A Well, I'm not -- again, with atmosphere, I don't think it would be of a significant -- because it's basically ambient temperatures, I don't think there would be a significant contribution. But my understanding of the operation is that materials on the floor would eventually make their way to one of the dischargers of the plant and probably be discharged through the same process that the -- the HCl waste would discharge.

Q Are you talking about discharged into wastewater area?

A Well, discharged into probably -- my understanding would be probably into the -- the 01 discharge into the creeks eventually.

Q Okay.

A I don't know that. But, again, I don't know that for sure. I don't know where these areas are specifically, but that's -- that would be my understanding.

Q Okay. By the way, how does an acidic condition affect weathering?

A Probably doesn't. I mean, PCBs are generally resistant to acid. The acidity in this process comes from the hydrochloric acid that's generated during the manufacturing process.

Q Which you then solve as muriatic acid?

A Right, yeah. The PCBs generally are not susceptible to any kind of change by acids.

(Defendants' Exhibit Kaley 10 marked for identification.)

Q (By Mr. Schick) Let me show you what I marked as Exhibit 10 to your deposition. And if you could, look at the page numbered 3 at the bottom. It's just the third page there.

A Okay.

Q And this is just a summary and it says, The Aroclor vapor concentration was found to vary widely depending on several factors.

And then it says, The actual Aroclor vapor concentrations varied from .35 milligrams per cubic meter to about 5 milligrams per cubic meter under the most severe conditions.

Then the next paragraph says, It was found, however, that the Aroclor vapor concentration in the air at the sample points is seldom below the .5 to 1.0 milligrams per cubic meter level, which is the maximum tolerable concentrations, and often is as high as 3 to 5 milligrams per cubic meter.

Those are also concentrations in the air that can wind up being dispersed beyond the plant facility itself, true?

A Well, again, there -- as I can recall this document -- and I congratulate my counsel for -- this is the one I mentioned earlier that he thought might come up.

Q Ding, ding, ding, ding, ding. It's always nice to get one right.

A That's right. It's my understanding that, again, like some of the other measurements, these

are right at positions within the manufacturing process itself. So all those processes that we talked about are going to occur. You know, they're at elevated temperature. It's going to condense. But that said, yes, I think it is a potential source of some level of PCBs of unknown concentration leaving the plant site.

Q And -- and certainly if that were in a part of the facility that was open to the environment, if it just had a roof, didn't have sides, even a greater likelihood of being dispersed into the atmosphere, true?

A Assuming there was some sort of wind blowing or something, yes.

Again, if I may, this is the -- this method I don't think is necessarily reliable for PCBs because it's a very old method which isn't actually measuring PCBs in the sense that we understand it. It's basically degrading the PCBs into chlorine and measuring the chlorine. So any chlorinated material present, HCl or anything present in those samples, would give a positive result. So they have to be taken with a grain of salt, but I'm not going to argue that it doesn't represent some atmospheric presence of PCBs.

(Defendants' Exhibit Kaley 11 marked for identification.)

Q Exhibit No. 11 to your deposition is a September 1970 memo. The subject is, Aroclor Losses to the Atmosphere at the HCl Scrubber Jet. And there is a reading of 64.9 pounds per day of PCB passes the HCl knockout tank.

Do you see that?

A I do.

Q And then it talks about, Assuming 100 percent contact at the jets, .47 pounds per hour or 11.84 per day of PCB is sewered with the remaining .11 pounds per year or 2.4 pounds per day -- that was .11 pounds per hour or 2.6 pounds per day being lost to the atmosphere. Poor efficiency at the jets increases the loss of PCB to the atmosphere considerably.

Again, this is an indication of PCBs that can wind up in the atmosphere, true?

A Yes. But, again, at the site of manufacture. No indication of how far they're moving away. But, yes, there's clearly -- it clearly says PCBs are being discharged to the atmosphere.

Q Sure. And I guess all I'm just talking

about here -- this is all being thrown up into the air, and then we go, as you point out, to our what are the congeners, how heavy are they, how long do they stay vaporized, how far do they go, true?

A Correct, yes.

Q Okay.

A Thank you.

(Defendants' Exhibit Kaley 12 marked for identification.)

Q (By Mr. Schick) Exhibit No. 12 to your deposition is the EPA's preliminary assessment of PCB air emissions, and I just wanted to go through kind of a listing that they have. And it's -- you've got to flip through this. It's page 3 of Exhibit -- or Attachment A, I think. So if you flip through, the third page says Attachment A. Go to three pages beyond that.

A Got you.

Q And it has this listing. Do you see that?

A Yes, I do.

Q And these purport to be, if you look, what the EPA refers to as a good summary of important factors for understanding the atmospheric transport of PCBs. Number one, atmospheric transport is a key mechanism for the global dispersion of PCBs.

And we've talked about that, true?

A Yes.

Q The second, Lower chlorinated congeners tend to be in the gas phase and therefore dominate in the atmosphere while heavier congeners adsorb to particulates.

True or not true? Would you qualify that?

A Well, I think we discussed this in some detail.

Q Yeah.

A I don't think they -- they necessarily preferentially adsorb the particulates --

Q Right.

A -- but the lower chlorinated come off those particulates more readily. So I think, yeah, that's --

Q And the truth is lower chlorinated congeners don't remain forever in the gas phase. At some point they're going to condense, and they can also adsorb to particulate?

A Well, but there's a continual exchange. There's a -- it's an ongoing exchange that continues to affect the levels, yes.

Q Okay. The next -- next point says, During transport, atmospheric PCBs can be deposited to soil

and water via wet deposition -- that is, rain or snow -- dry deposition, settling of particles with PCBs adsorbed, or gas absorption.

You agree with that?

A Gas absorption. I'm not sure what gas absorption means, but I'll agree with the first two.

Q Okay. Can PCBs be absorbed into water molecules picked up and deposited as rain somewhere down the road?

A Well, I think that's what the first part of that third bullet says. I mean, it's not really that they're --

Q That's not the gas absorption; that's --

A That's -- well, it says deposited to soil and water versus wet deposition. So they're basically adsorbed onto the rain or snow and deposited that way.

Q But that's how it's done, is it's adsorbed?

A Yes, yeah, yeah. It's not getting into the molecules themself. It's being -- it's kind of like being washed out in the same way that, you know, kind of dust is washed out. It's just -- yeah, it adsorbs.

Q PCBs can also volatilize in the gas form into the atmosphere from soil and water or resuspend

in the air on particulate matter.

And that's true? We've talked about that, true?

A Yes, that's correct.

Q It is estimated that the atmosphere is a net recipient of PCBs from these reservoirs.

Do you know what that means?

A Well, to me it means more is going into the atmosphere than is coming out. I don't know whether I agree with that or not, but...

Q Okay. The atmosphere --

A Let me just qualify that. The reason I don't believe that is I think worldwide PCB levels are decreasing in the atmosphere, and if this were true, they'd be increasing. So I don't think -- I don't -- I just don't -- I don't agree with this statement.

Q Decreasing in the air?

A Uh-huh.

Q Worldwide?

A Uh-huh.

Q Is that yes?

A Yes.

Q It says, The atmosphere half-lives of PCB congeners range from weeks to years.

Do you agree -- are you able to agree or disagree with that?

A No. As I sit here today, I don't -- I don't know enough to say one -- whether that's correct or not.

Q Okay. And then this next one tries to, I guess, kind of shave this a little bit closer. It says, Biphenyls with 0 to 1 chlorine atoms remain in the atmosphere and degrade first. Those with 1 to 4 chlorines migrate toward polar latitudes in a series of volatilization/deposition cycles. Those with 4 to 8 chlorines remain in mid-latitudes, and those with 8 to 9 stay close to the source of contamination.

Agree or disagree?

A Okay. I --

Q Or is it too general?

A Well, I -- I kind of addressed this earlier, and my answer would disagree with this. Now, I didn't do a literature search, which they say they did. So I'm going to say that both with regard to my earlier answer and with this -- regard to this question, I don't have enough information as I sit here to -- to agree or disagree.

Q Yeah. And I thought one of the things we

talked about earlier was even in the Arctic you can find some decachlorobiphenyl?

A Well, I would -- that's not necessarily deca. But I would say 1254- or 1260-like materials.

Q Fair enough.

A Higher chlorinated materials. So...

(Defendants' Exhibit Kaley 13 marked for identification.)

Q (By Mr. Schick) Let me show you Exhibit 13. This is a February 11, 1959, Monsanto document that contains discussion about expansion of the Aroclor department.

You're familiar with this, are you not? You've seen it before?

A I don't think I have. I don't know. As I sit here, I don't recognize it, but given time to read it, I might. But I don't know for sure.

Q Here's what I wanted to ask you about: It says, In the past, there was room for expansion in the Aroclor still room.

Then under overall plan for the department, it looks like, 27, A, Disposal of Still Residue, present disposal of still residue is uneconomical and takes much of the available material handling space. In the future, Aroclor still residue will be

pumped into trash skips located east of the Aroclor still room and removed by truck. This will provide more room for material handling and eliminate the necessity of drumming Aroclor still bottoms for disposal.

So what they're talking about here is chlorinated still bottoms, what we called earlier Montars, true?

MR. MERRILL: I'm going to object to this line of questioning, again for the reason that it's beyond the 30(b)6 designation.

A Yes. They're talking about Aroclor still bottoms.

Q (By Mr. Schick) Okay. And the way I read the first sentence and I put that note there, does that mean that the still bottoms were kept around for some period of time before they were taken to the landfill, or do you know?

A I don't know, but that's not the way I would read it.

Q How would you read it?

A I would read it that having a lot of drums there takes up a lot of space.

Q Fair enough. Next section talks about solid Aroclors 5460 and 1268. It says, A multi-purpose

flaker will be installed on the second floor of the Aroclor still room, as shown in the attached sketch. The finished product will be packaged in bags and placed on pallets.

Do you know whether -- when those were being placed in bags whether there -- whether dust was generated during that process of loading up the bags?

A Can I preference that with a statement? That I don't know that either one of these were ever done. I mean, these are plans. I don't know that either one of these were ever implemented. And in fact, I know a flaker was placed, but it was not placed where it says here. So I don't -- I don't know that any of this was ever done.

Q Did the flaker permit emissions to the air?

A I believe there could have been dust emissions, yeah.

Q And would those have been of the heavier Aroclors, like a 1268?

A Well, they would have been solid Aroclors.

Q Solids.

A You can't flake liquids.

Q Was 1268 run through the flaker?

A For some period of time, yes.

Q Okay. Do you know what period of time?
A Not specifically.
(Defendants' Exhibit Kaley 14 marked for identification.)
Q (By Mr. Schick) Let me show you Exhibit 14 to your deposition. This is a September 5, 1969, memorandum that appears to be minutes of the Aroclor ad hoc committee and its first meeting, and I wanted to direct your attention to page 3 of this document.
It says, Air pollution reduction has not been considered by the plants to date except as incidental prevention of product contamination during tank car and drum loading operations.
Now, tank car and drum loading operations would include the loading of chlorinated biphenyls, right?
A Oh, I think that's all this is talking about.
Q Yeah, right. And, well, I guess my point just was: You're going to get some emissions into the air during those processes as well, true?
A Some unknown amount of emissions, yes.
Q Okay. Then it says, Long range, 1 to 2 year, improvements at Anniston are planned to reduce product contamination and air emissions in the car

loading operations. It was agreed that a comprehensive air sampling and testing program would be very expensive and is probably not justified at this stage of the problem.

And then with respect to customers, the next paragraph says, Our in-plant problems are very small versus problems of dealing with environmental contamination by customers. In one application alone, highway paints, one million pounds per year are used. Through abrasion and leaching, we can assume that nearly all of this Aroclor winds up in the environment.

What do you know about Aroclors in highway paints?

A Well, not much more than what it says. I know they were used there. I know my friend Bill Papageorge always says, That's why the lines don't stick to the highways anymore, because they quit using Aroclors.

But, I mean, yes, they were clearly used in highway paints.

Q All over the world?

A Well, I don't know that.

Q All over the country?

A In sections of the country. Again, I don't

know what the distribution was, but it was a -- it was a known usage, and I would guess most highway departments used it, yes. But, again, those -- those PCBs are going to be attached to that paint, and they're not going to be readily available for other kinds of distribution. In fact, it's even going to be more than like on a soil particle because they're going to be in that paint matrix. So they're not going to volatilize very easily --

Q Right.

A -- or be leached very easily.

Q Okay.

(Defendants' Exhibit Kaley 15 marked for identification.)

Q (By Mr. Schick) Exhibit 15 to your deposition is a December 29, 1970, memorandum to Mr. Papageorge, and it says, Listed below is the data which has been collected to date on PCB losses to the atmosphere in Anniston. And it has a listing here of a test done November 24 of the Montar hood.

Do you see that?

A Yes, I do.

Q Was the Montar hood discharged into the atmosphere?

A I don't know the answer to that.

Q Okay. It appears, though, that the highest concentrations of PCB levels in the ambient air were of or off the Montar hood, if you look at that column PCB concentrations milligram per meter, true?

A Yes. While it was drawing Aroclor 1242 bottoms. So, again, those are the more highly chlorinated Aroclors. I don't know that that would be true for -- for other Aroclors. But based on this piece of paper, that's true.

Q Because -- and what you're referring to is the last column? What you believe they were drawing on November 24 of this year were 1242s?

A That's what it says, yes.

Q Yeah, okay. Of course, if the Montar hood vented those materials to the atmosphere, they could then be transported via the air mechanism we've talked about earlier, true?

A Right. Subject to all the provisos we've talked about, yes.

Q Fair enough.

(Defendants' Exhibit Kaley 16 marked for identification.)

Q (By Mr. Schick) Exhibit No. 16 to your deposition is a May 12, 1969, memorandum. And I don't need to dwell on -- there's one statement on

page -- I think it's 3 at the top. Work to minimize losses at Anniston and then it says, External to plant, that a problem exists at Anniston is evident because, quote, free globules of Aroclors can be seen in Snow Creek.

And here's my 30(b)6 question to you: When you have free globules of Aroclors, you've got something that can be volatilized still into the air, true?

A Well, possibly eventually. I mean, these are in Snow Creek.

Q Right.

A So they're in the bottom of Snow Creek. So because PCBs sink, they don't float. So, again, for them to be volatilized, they're going to have to dissolve in the water, which is a very slow and inefficient process. And then further they're going to have to volatilize from the water into the atmosphere. So, again, I think, although theoretically, what you described in your question could occur, it's not going to be a very efficient process for getting PCBs into the air. It's going to be a very inefficient processes, which is, you know, maybe unfortunate because that's why they were still globules in the bottom of the creek.

Q Yeah. And, of course, so what that does demonstrate to us, though, what this exhibit does demonstrate to us, though, is that discharge of Aroclors into the wastewater, into the creeks, was certainly an issue at this time?

A Yes.

Q And would you -- are you able to say whether you would expect the relative percentage of Aroclors in the water discharge to be comparable to the production of various Aroclors?

MR. MERRILL: Object to the form of the question.

Q (By Mr. Schick) We talked about this earlier. You know, you had your percentage of --

A Yeah. My presumption would be that at the immediate point of discharge, it would be reflective of the materials that were being produced, so that that chart would be approximately correct at the point of discharge.

Q And -- and the globules, those certainly could be deposited on the -- on the floodplain in the event of a flood? I mean, if you have some flood event that picks up that sediment, it can go into the floodplain or wherever that sediment goes?

A Yeah, I believe that's correct. But let me

add another thing here. I think those globulars -- globules are more likely to be the lower chlorinated materials.

Q Why is that?

A Because the higher chlorinated materials, even starting at 1254, are almost solid. So my view of a globule is a little droplet of something on the bottom of the stream. Aroclor 1254 or 1260 would not be that. 1260 would be a resonance material at ambient temperatures underneath water. Plus those heavier chlorinated materials are more likely to have been trapped in the limestone beds just because of their physical properties. So to the extent that this is correct, my -- my understanding of the properties of PCBs, they would be more 1242-like materials.

Q Okay. But, of course, depending on the flood event and --

A Yeah. I'm not -- that's in addition to your question.

Q -- and the volume of water?

A I agree with your question. That if you've got PCBs in a globular form and you have a flood event, they could certainly be transported to some extent by that event.

Q Regardless of which Aroclor it is, depending on --

A Yes.

Q -- flow, speed, volume, etc.?

A I would agree with that.

(Defendants' Exhibit Kaley 17 marked for identification.)

Q (By Mr. Schick) Exhibit 17 to your deposition, Dr. Kaley -- and I just want to ask you to -- page 8. This is an EPA document by the way. I don't mean to be obtuse with you here about these things. It says, The sources of P -- and I'm sorry. I'm looking at page 8.

A Yeah, I'm with you.

Q Did you get it?

A Yes.

Q The sources of PCB effluents including -- included the hydrochloric acid, chlorinator, still room, and warehouse sewers. At times the chlorinator and still room sewers had an Aroclor phase. The major losses from the warehouse sewer were due to spills while drumming or flaking. These spills were swept to the sewer during floor cleanup. The HCl scrubber jets sewered -- and I think we saw a document earlier that talked about this 11.84

pounds per day of PCB in 1970. These sewers discharged into the Snow Creek, Choccolocco Creek watershed.

And then it says, About 1.8 million pounds of PCBs are estimated as discharged by the sewers from the production of Aroclors at the Anniston plant.

And my question is: Do you agree that the discharges over time were in that range?

A I have no idea as I sit here.

Q Okay. Are you aware of any studies that show the air-water exchange of PCBs has the potential to be a significant source of PCBs into the atmosphere?

A Well, I certainly know that it occurs, and I guess that depends on your definition of significant.

Q Fair. Okay. Fair enough.

(Defendants' Exhibit Kaley 18 marked for identification.)

Q (By Mr. Schick) I wanted to ask you if you have seen Exhibit No. 18, which is a 2002 article that appeared in Environmental Science Technology.

A Yes.

Q You've seen that before?

A Yes.

Q And what they did suggest that there's an air-water exchange of T or total PCBs that has the potential to be a significant source of PCBs to the rural atmosphere.

Do you see that?

A I see that that's what their conclusion is, yes.

Q Do you agree with that or do you agree that their study concluded -- that their study demonstrated that?

A Well, I'm not sure, without reading the article, I could really make an intelligent decision or an answer to that question. But if you look at the rest of the abstract, I mean, 120 micrograms per square meter per year, I mean, those aren't huge numbers, you know, into the whole total atmosphere, because, you know, the atmosphere is very big.

So I don't -- I don't know whether that -- you know, I'd be more interested in how that contributed to a measured level in the atmosphere rather than just how much they're measuring coming off the soils.

Q But you don't disagree that this is a phenomenon that --

A Oh, no. Clearly a phenomenon that occurs.
Bless you.
MR. SCHICK: Thank you.
THE WITNESS: Bless you.
MR. SCHICK: Thanks.
(Defendants' Exhibit Kaley 19
marked for identification.)
Q (By Mr. Schick) Let me give you Exhibit 19. And, again, what I'm looking at here is an amount of discharge that may be -- may have been free for being taken up either by waterways or by ambient air. This is an August 7, 1970, document. At the top it says, Confidential - FYI and destroy.
And then status says, We are presently discharging to Snow Creek about 16 pounds a day of PCBs, down from 250 pounds per day in '69. Measurements of departmental waste streams show a total loss of only 2 pounds per day. The discrepancy is believed due to, A, sampling problems in departmental waste streams where two-phase systems of water and free Aroclors may be present; and B, possible pickup of PCB by leaching previously deposited PCB from the limestone neutralization pit which also acts as a settling basin.
Now, is that limestone neutralization pit

the same one you were referring to earlier for Montars --

A Not for Cleghorn.

Q -- Lake Cleghorn?

A No, no, no. The -- these are -- the limestone pits were actually just prior to the discharge into the waterways that eventually led to Snow Creek. Cleghorn's Lake was in the middle of the plant and, again, wasn't a lake. It wasn't a body of water.

Q Right. Okay. But what this document indicates in 1970 is that PCBs were apparently being leached out of that neutralization pit?

A Well, that was --

Q And taken to a waterway?

A That was the possibility that was being considered here, yes.

Q And, in fact, one of the ways they thought about reducing those losses was to install a sump? You see that in paragraph A underneath there, Work to further reduce.

MR. MERRILL: Again, I want to object to this line of questioning to the extent that it's beyond the 30(b)6 designation. It's skirting around it and may get into it, but...

MR. SCHICK: Fair enough. Fair -- you know what? I'll withdraw that question.

Q (By Mr. Schick) I want to go back to paragraph 1 again. It says, A, sampling problems in departmental waste streams where two-phase systems of water and free Aroclors may be present.

What does that mean?

A Well, that's kind of like the globular things in Snow Creek. You've got a -- you've got an organic Aroclor phase because PCBs don't dissolve in water, and then you've got the water phase. So if you -- if you drop a drop of PCBs into water, it's going to sink to the bottom, remain as a globule. That's the two-phase system. You have a water phase and an aqueous phase. It's the oil and vinegar story.

Q Understood. And this is actually happening in the process plant at that time?

A According to this document, yes.

Q Okay. And do you know how far downstream those PCBs would be taken?

A You know, I don't. I don't know how -- what that two-phase system -- how far it persists --

Q Yeah.

A -- or persisted at the time.

(Defendants' Exhibit Kaley 20 marked for identification.)

Q (By Mr. Schick) Exhibit 20 to your deposition is an October 1969 report of the Aroclor ad hoc committee. You've seen this document before?

A Yes.

Q And some of the recommendations, if you turn to page 3 of the document, for losses of Aroclors in liquid wastes -- and I assume when we talk about liquid wastes, those are wastes made available to the waterways in Anniston, true?

A Yeah.

Q And the goal was to try to reduce those to less than 5 parts per billion?

A That's what's written on here, yes.

Q At least for -- it says -- it looks like 1254 and maybe 12 -- it says 126 and then -- you see that off to the side?

A Yes, I see that. I assume it's 1260.

Q Okay. And then determine extent of atmospheric losses from Aroclors from Anniston and WGK plants and develop plans for control.

So clearly there was an understanding of losses to atmosphere?

A Well, from this document, you would say

there was an understanding of the potential for losses from the atmosphere. I mean, it basically says we don't know what the extent of those losses are, but the potential is clearly there, yes.

Q If you'll turn to page 8, under 4 it says, Investigation has shown that the waters in receiving streams below the Anniston plant contain significant, parentheses, parts per million, concentrations of PCB. More ominous perhaps is the fact that sediment in the bottom of these streams miles below our plants may contain up to 2 percent Aroclor.

You don't have any reason to disagree with those findings, do you?

A No.

Q And then it says, To prepare for the eventual publication in the press of the discharge of PCBs in Alabama and to the Mississippi River, a significant effort must be made to determine the present levels and determine the levels of contamination as cleanup procedures begin.

I didn't understand the Mississippi River.

MR. MERRILL: I'm going to object to this line of questioning to the extent it's beyond the scope of the designation, 30(b)6 designation.

Q (By Mr. Schick) Do you have any knowledge about transport of PCBs from Anniston to the Mississippi River?

A No. The Sauget plant that made PCBs is on the Mississippi River.

THE VIDEOGRAPHER: We have about 4 minutes, Counselor.

MR. SCHICK: You know, if I can take a 5-minute break, I'll finish in less than 10 minutes, if that's okay with y'all.

THE WITNESS: It's your day.

THE VIDEOGRAPHER: We're off the record at 12:23. This ends tape No. 3.

(Off the record.)

(Defendants' Exhibit Kaley 21 marked for identification.)

THE VIDEOGRAPHER: We are back on record at 12:31. This begins tape No. 4 of the deposition of Dr. Robert Kaley.

Q (By Mr. Schick) Thank you. Dr. Kaley, I've got Exhibit 21 up, which is the last exhibit I intend to ask you about. This appears to be a September 18, 1970, document, again referring to the Anniston facility.

It says, In reviewing your proposed letter

to Joe Crockett with legal, we requested latest emissions data on the flow to Snow Creek. We had hoped that it might show an improvement over the first week in September and thus demonstrate a favorable trend to Crockett. Instead, the emissions are considerably increased with 9/13/70 at 6.25 parts per million or about 80 pounds of PCB for the day.

Now, do you have any idea as to what that referred to in the way of Aroclor, slash, homologues?

MR. MERRILL: Again, I'm going to object to the question as being beyond the scope of the 30(b)6 designation.

A No. Without seeing the analytical data, I couldn't speculate.

Q (By Mr. Schick) Do you know whether there was any analytical data that differentiated what the 80 pounds consisted of?

A Presumably somebody made a measurement, so there must have been some at some point. I have no idea whether it exists.

Q Okay. It continues and says, There's extreme reluctance to report even the relatively low emission figures because the information could be

subpoenaed and used against us in legal actions. Obviously having to report those -- these gross loss multiples, enormously, our problems because the figure would appear to indicate lack of control.

Do you ever speak with anyone who was involved in doing these -- the studies back at that time in 1970?

A Not about those studies. I mean, I've clearly spoken with people that were involved in them, but not -- not about this document or what those studies were shown or --

Q Okay.

A -- seen the results or anything.

Q And you don't know over time what the discharges were to various waterways in the Anniston area other than what might be reflected in documents like this?

A That's correct.

Q Is it -- is it your view that when PCBs adhere to soil particles and then become subject to movement through storm water or surface water, that they tend to form a gradient with concentrations decreasing as they move away from the source?

A Generally I would say that's true, yes.

Q Okay. Is it your expectation -- now, by the

way, when you say generally that's the case, it can be different when you have varying flood events or different types of flood events, true?

A Or, you know, there's unseen things like people moving sediments mechanically and stuff like that. I mean, it's not necessarily going to be a smooth gradient, but it's going to be a general trend.

Q And of course, as we discussed earlier, you can have instances where PCBs carried through waterway sediment lands on a floodplain and upon drying it could become volatilized or at least enter the atmosphere through particulate?

A It's possible at some level, yes.

Q Okay. Is it your expectation, Dr. Kaley, that if there's a source of PCBs to a surface waterway, you'd expect to find higher concentrations -- higher concentrations of the PCBs upgradient near the location of the release as opposed to further away?

A All right. Would you read that again, please?

Q Yes, sir. Is it your expectation that if there's a source of PCBs to a surface waterway, you'd expect to find higher concentrations

upgradient near the location of the release as opposed to downgradient where you'd find lower concentrations?

A In general that would be true, yes.

Q Again, with some of the exceptions that we've already talked about today?

A Right.

MR. SCHICK: Those are all of my questions, Dr. Kaley. But somebody on the phone might have one or two or I don't know how many. I don't want to speak for them. But I think we're -- thank you very much.

MS. LAVEY: I have none.

MR. SCHICK: On the phone?

MR. HEISTER: This is Michael Heister. I don't have any questions.

MS. SMITH: This is Lynette Smith. I don't have any.

MS. McADAM: This is Allison McAdam. I don't have any.

MR. SCOTT: This is John Scott. I don't have any.

MR. NICHOLS: Ron Nichols. No questions.

MR. MERRILL: I have one question.

MS. LEMMER: Julie Lemmer. I have no

questions.

MR. SCHICK: Okay.

MR. MERRILL: I do have one question.

EXAMINATION

QUESTIONS BY MR. MERRILL:

Q We were talking -- on Exhibit 13 there's a mention of the flaker, and they were discussing solid Aroclor 5460.

A Yes.

Q What is Aroclor 5460?

A It's a polychlorinated terphenyl product.

Q Okay. That is not a PCB?

A It is not a PCB. It's three benzene rings rather than two benzene rings.

Q Okay.

A So the Aroclor department was the polyphenol department, meaning many phenol rings. So there were PCBs and there were polychlorinated terphenyl products.

MR. MERRILL: Okay. No other questions.

MR. SCHICK: Thanks.

THE WITNESS: You're welcome. Thank you.

MR. SCHICK: Off the record.

THE VIDEOGRAPHER: This concludes the deposition of Dr. Robert Kaley. We are off record

at 12:36.

MR. SCHICK: Thank you both very much.

(Original Defendants' Exhibits Kaley 1 through 21 attached to original transcript.)

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WITNESS CERTIFICATION

I, Robert G. Kaley, II, said witness, do hereby acknowledge that I have read the foregoing transcript of my testimony and that it is a true and correct transcription of the answers given by me to the questions propounded, except for the changes, if any, noted on the attached errata sheet.

Witness Signature above:

Printed name: ROBERT G. KALEY, II

Sworn to and subscribed before me, this
the 13 day of January, 2010.

Notary Public
My Commission expires: _____

LYNNE L. ANGLE
Notary Public - Notary Seal
STATE OF MISSOURI
St. Francois County
My Commission Expires: April 22, 2011
Commission # 07513570

Deposition of: Robert Kaley
Taken: 12/08/09
Court Reporter: Pamela Harrison

TRANSCRIPT ERRATA SHEET

Deposition of: Robert Kaley
Taken: 12/08/09
Court Reporter: Pamela Harrison

Page #:	Line #:	Correction/Reason for change:
10	8 and throughout	Solucia should read Solutia (sp)
18	2	trichloral should read trichloro (sp)
24	1	class should read glass (tr)
31	1	parallel should read particulate (tr)
34	1 & 2	trichloral should read trichloro (sp)
36	21	1260-A should read 1268 (tr)
40	16	trichloral should read trichloro (sp)
40	17	PCB 11 is a dichloro, not a trichloro congener (misspoke)
58	18 & 19	parallel should read particle (tr)
79	13	incinerateds should read incinerators (tr)
120	7	1948 should read 1949 (misspoke)
127	19	polyphenol should read polyphenyl (tr)
129	17	solve should read sold (tr)
147	9	resonance should read resinous (tr)
161	16	polyphenol should read polyphenyl (tr)
161	17	phenol should read phenyl (tr)

NOTE: (tr) = transcription; (sp) = spelling

STATE OF MISSOURI

SS.

CITY OF ST. LOUIS

I, Pamela Watson Harrison, CBC, CRR, RPR, MO CSR #557, IL CSR #084-003684, and Notary Public in and for the State of Missouri, duly commissioned, qualified and authorized to administer oaths and to certify to depositions, do hereby certify that pursuant to Agreement in the civil cause now pending and undetermined in the United States District Court for the Northern District of Alabama, Eastern Division, to be used in the trial of said cause in said court, I was attended at the offices of Husch Blackwell Sanders, LLP, 190 Carondelet Plaza, Suite 600, St. Louis, Missouri, by the aforesaid witness; and by the aforesaid attorneys; on the 8th day of December, 2009.

That the said witness, being of sound mind and being by me first carefully examined and duly cautioned and sworn to testify the truth, the whole truth, and nothing but the truth in the case aforesaid, thereupon testified as is shown in the foregoing transcript, said testimony being by me reported in shorthand and caused to be transcribed into typewriting, and that the foregoing pages

correctly set forth the testimony of the aforementioned witness, together with the questions propounded by counsel and remarks and objections of counsel thereto, and is in all respects a full, true, correct and complete transcript of the questions propounded to and the answers given by said witness; that signature of the deponent was reserved by agreement of counsel.

I further certify that I am not of counsel or attorney for either of the parties to said suit, not related to nor interested in any of the parties or their attorneys.

Witness my hand and notarial seal at St. Louis, Missouri, this 15th day of December, 2009.

My Commission expires July 17, 2013.

_ _ _ _ _ _ _ _ _ _ _ _

Notary Public in and for the

State of Missouri

Gore Perry Gateway & Lipa Reporting

Charles Merrill, Esq.
Husch Blackwell Sanders, LLP
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St. Louis, MO 63105

Enclosed please find the Original Signature pages and errata sheets for the deposition of:
Robert Kaley, Ph.D. taken 12/8/2009 in the case of:
Solutia, Inc., et al. vs. McWane, Inc., et al.
Please read your copy of the transcript, noting any corrections on the enclosed erratta sheets, and return all pages for filing in court to:
Wendlene M. Lavey, Esq.
Squire, Sanders & Dempsey, LLP
127 Public Square, Suite 4900
Cleveland, OH 44114-1304

Your prompt cooperation will be appreciated.
Sincerely,

Gore Perry Gateway & Lipa Reporting

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Comes now the witness, Robert Kaley, Ph.D., and having read the the foregoing transcript of the deposition taken on the 12/8/2009, acknowledges by signature hereto that it is a true and accurate transcript of the testimony given on the date hereinabove mentioned.

_____

Robert Kaley, Ph.D.

Subscribed and sworn to me before this

_____ day of _____,2009.

My Commission expires 9/16/2006

_____

Notary Public

COURT MEMO

.

4

Solutia, Inc., et al. vs. McWane, Inc., et al.

V-03-PWG-1345-E

CERTIFICATE OF OFFICER AND

STATEMENT OF DEPOSITION CHARGES

DEPOSITION OF ROBERT KALEY, PH.D.

TAKEN ON BEHALF OF THE DEFENDANT

12/8/2009

Name and address of person or firm having custody of the original transcript:

Wendlene M. Lavey

Squire, Sanders & Dempsey

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IN WITNESS WHEREOF, I have hereunto set my hand and seal on this _____ day of _____

Commission expires 9/16/2006

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Notary Public