OFFICE OF ZONING AND ADMINISTRATIVE HEARINGS

FOR MONTGOMERY COUNTY

PETITION OF COSTCO WHOLESALE CORPORATION	:	**Case No. S-2863** **OZAH No. 13-12**

A hearing in the above-entitled matter was held on February 10, 2014, commencing at 9:35 a.m., at the Office of Zoning and Administrative Hearings, 100 Maryland Avenue, 2nd Floor Council Hearing Room, Rockville, Maryland 20850 before:

Martin L. Grossman

Hearing Examiner

A P P E A R A N C E S

For the Applicant:

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C O N T E N T S

E X H I B I T S

P R O C E E D I N G S

MR. GROSSMAN: This is the 25th day of a public hearing in the matter of Costco Wholesale Corporation, Board of Appeals No. S-2863, OZAH No. 13-12, a petition for a special exception pursuant to Zoning Ordinance Section 59-G-2.06 to allow petitioner to construct and operate an automobile filling station which would include 16 pumps. The subject site is located at 11160 Veirs Mill Road, Silver Spring, Maryland, Lot N, 631 Wheaton Plaza, Parcel 10, also known as Westfield Wheaton Mall, and is zoned C-2, general commercial.

The hearing was begun on April 26, 2013, and resumed numerous times, as we all know. It was noticed to resume again today, and the next session has been noticed for Thursday, February 13, 2014, here in the second floor hearing room of the COB at 9:30 a.m.

This hearing is conducted on behalf of the Board of Appeals. My name is Martin Grossman, which means I will take evidence and write a report and recommendation to the Board of Appeals which will make the decision in this case. Will the parties identify themselves for the record, please?

MR. BRANN: Good morning. Erich Brann for Costco.

MR. GROSSMAN: Good morning, Mr. Brann.

MS. HARRIS: Good morning. Pat Harris on behalf of Costco.

MR. GROSSMAN: Ms. Harris.
MR. GOECKE: Good morning. Mike Goecke for Costco.
MR. GROSSMAN: Mr. Goecke.
MS. CORDRY: Karen Cordry for Kensington Heights Civic Association.
MR. GROSSMAN: Good morning.
MS. ROSENFELD: Michele Rosenfeld with Kensington Heights.
MR. GROSSMAN: Ms. Rosenfeld.
MR. SILVERMAN: Good morning. Larry Silverman, Stop Costco Gas.
MR. GROSSMAN: Mr. Silverman.
MS. ADELMAN: Good morning, Mr. Grossman. Abigail Adelman for the Coalition.
MR. GROSSMAN: Welcome. And in the back we see some other people. Anybody else who is to offer testimony here? Yes, sir.
MR. BREYSSE: Patrick Breysse from Johns Hopkins University Bloomberg School of Public Health.
MR. GROSSMAN: Dr. Breysse, welcome. All right. I see some other familiar characters who are not presumably going to be witnesses today.
MS. ROSENFELD: And Ms. Duckett, I said she would be here later this morning.

MR. GROSSMAN: All right.
MS. ROSENFELD: She had a conflict.
MR. GROSSMAN: Okay. Let's turn to a few preliminary matters. First of all, exhibits received since our last session, that would be Exhibits 426 through 437. And 426 was a notice of the additional hearing dates sent on January 22, 2014; 427, e-mails between the parties on January 30 regarding scheduling of Dr. Jison's testimony; 428, a memo from Ms. Rosenfeld on January 31, 2014, submitting documents into the record; 429, materials by Ms. Rosenfeld received on January 31, 2014 -- additional materials, I'd say -- 430, once again, materials from Ms. Rosenfeld; 431, e-mails from Ms. Cordry, submitting materials that may be referenced by Dr. Breysse or Dr. Jison, and 431(a) is a PDF of some of the annexed pages, and 431(b) is a summary, or what's entitled Summary of Existing Documents and Testimony About Background Levels Measured at Various Monitors in the Area and History of Methodology Choices; 432 -- and we'll discuss this further because it's been the subject of some discussion in the e-mail exchanges -- 432, e-mails between the Hearing Examiner and Ms. Adelman regarding Sam Campbell's testimony, and 432(a) is a copy of an e-mail sent from Ms. Campbell on November 13, 2012; 433, documents submitted by Ms. Rosenfeld on February 3, 2014; 434, e-mail from Cindy Holland

regarding her desire to testify, and 434(a), a list of her qualifications; 435, an e-mail between the parties, February 3, 2014, regarding the testimony schedule, closing arguments; 436, e-mails between the parties, February 3, 2014, and regarding the author of that Exhibit 431(b). 437, which I didn't have when I made up this little cheat sheet, was another, apparently another e-mail from Ms. Rosenfeld, which I don't think I've seen, and then there was also an exchange which didn't yet make it into the -- an e-mail from Mr. Silverman, which I responded to. It doesn't have an exhibit number yet unless it's on here and I didn't see it. Let me take a quick look. No, not yet on here.
Okay. As I understand it, the witnesses scheduled for today, Dr. Breysse. We've received correspondence, as I understand it, from Mr. Doug Sims, a resident, not being called by any party thus far, Ms. Debra Houseworth, and Ms. Ann Statland; their scheduling, I guess, to be determined, depending on how long it takes to go through the scheduled expert testimony, and of course, the schedule for Dr. Jison is up in the air, and we'll get back to that. Okay. And that's the -- let's take that as the first question. Who do we have scheduled for February 13 -- and we ought to also address the question of weather because I understand it may snow that morning -- and have the parties agreed on how we should calendar the rest of the hearing

dates?
So let me mention, on the weather front, we have -- on our website we published a procedure that we follow. That is, generally speaking, we follow the Montgomery County Schools' process because the Montgomery County government essentially never closes and it's a problem to conduct hearings when the, public hearings, when the public can't get here because of bad weather conditions. So our published requirement is following Montgomery County Schools. So if they say they're going to open two hours late, for example, we'll open two hours late. If they say they're not opening, we won't open.
MS. ROSENFELD: Okay.
MR. GROSSMAN: Unless everybody here wants to do something different, that's what we would follow. Do you want to -- anybody want to speak to that point?
MS. ROSENFELD: I'm happy with that policy.
MS. HARRIS: Not sure how to answer.
MR. GROSSMAN: All right. I mean, I've made exceptions to that in cases that generally don't involve a lot of public showing up -- when we conduct human rights cases, and usually that involves individuals involved in that case. I'm a little bit leery of having cases that are open to the public and have been noticed widely begin when we have terrible weather conditions that might endanger

people. So, all right, since there's no objection, let's follow that stated policy --

MS. ADELMAN: Yes.

MR. GROSSMAN: -- check as to what's happening at Montgomery County Schools, and let's follow that for Thursday and Friday, which are the next scheduled hearing dates.

All right. Let me hear first, I guess, from Ms. Harris as to what, if anything, the parties have agreed to in terms of the scheduling of the parties -- the hearings, rather.

MS. HARRIS: Yes, and some of this is dependent on Opponents' timing, but it's our understanding that Dr. Jison is only available February 25th and that the -- so we have the 10th, the 13th, and then we had determined that we would cancel the 14th because the opponents thought that they would be done their witnesses except for Dr. Jison, and they can speak more to that perhaps.

So right now the tentative suggested schedule is the 10th, today, the 13th, cancel the 14th, February 25th, February 26th, and then March 3rd. And then Opponents thought that it was necessary to have one more backup day, and unfortunately, given our various schedules and other cases that are going on, the next available date was March 25th for that --

MR. GROSSMAN: Wow.

MS. HARRIS: -- for that backup day.

MS. ROSENFELD: The next date that --

MS. ADELMAN: That you were available.

MS. ROSENFELD: -- that Costco was available.

MS. ADELMAN: Yes.

MS. ROSENFELD: We had offered any two or three days the week of March 3rd.

MR. GROSSMAN: As I mentioned in one of the e-mail exchanges, I do try to accommodate parties and the witnesses, including the expert witnesses, but there also has to be some accommodation by the expert witnesses. So I offered, as I said, to subpoena Dr. Jison, if necessary, depending on what the nature is of her other obligations. I haven't heard any description of --

MS. ROSENFELD: We --

MR. GROSSMAN: -- what they are.

MS. ROSENFELD: Okay. We shared those with opposing counsel. I realize now you were not. Dr. Jison works for the federal government. She has meetings that have been scheduled. She is not in control of those meetings. It's a regulatory agency. They involve people from outside parties coming in. Her supervisors control those meetings. She can neither schedule them and she is not allowed to be absent from them.

MR. GROSSMAN: Well, a subpoena is a good excuse --

MS. ROSENFELD: Well, I --

MR. GROSSMAN: -- and so we have meetings --

MS. ROSENFELD: -- I understand that, but she --

MR. GROSSMAN: -- we have meetings scheduled, too, and that, public hearings that have been noticed for a long time.

MS. ROSENFELD: And we really, in good faith, thought that she would be done on the 10th, and Dr. Jison is not a paid expert witness. She's in a different position from a lot of the other expert witnesses in this case. This is not her primary profession. She's doing this, she's a resident of the community, she has an expertise, and she's spent a lot of time in these proceedings, and she spent a lot of time preparing for. And --

MR. GROSSMAN: I'm not going to impose issuing a subpoena if the parties don't want, if you agree to something else. I just wanted to --

MS. ROSENFELD: We --

MR. GROSSMAN: -- an understanding that this is a proceeding that involves many people and notices that go out to a hundred people --

MS. ROSENFELD: I understand that.

MR. GROSSMAN: -- formal notices. So it's not as

if it needs to take second fiddle to a meeting that some federal supervisor has scheduled.

MS. ROSENFELD: And for the record, I'd like to make one other observation. We have had February 14th on the record as a noticed hearing date for a long time --

MR. GROSSMAN: Right.

MS. ROSENFELD: -- and Dr. Jison comprises a very limited component of this case. I understand Mr. Guckert, for one, is a rebuttal witness that has nothing to do with Dr. Jison's testimony, and if there are other rebuttal witnesses -- and we don't know, aside from Mr. Sullivan, who they might be -- I candidly don't understand why Costco cannot proceed with its rebuttal on the 14th.

MR. GROSSMAN: Let's hear from Applicant on that.

MS. HARRIS: Just customarily, we thought it made sense for the opponents to conclude their case. We had, based on the hearing back in January, when Dr. Jison was supposed to testify this week, we had all our witnesses lined up for rebuttal and we knew their availability and everything was going to flow smoothly. Then there was this issue that she couldn't be available. So we tried to restructure various, our opponents' availability and wanted to make sure that the rebuttal case was completed, and at this point, I don't even think Mr. Guckert is available on the 14th. I mean, we had intended him to be testifying, I

don't even remember what date it was, but he had fit into a slot before we had to restructure the entire schedule.

MR. GROSSMAN: All right. Well, let's turn to the so-called bottom line and what the parties want to do here. So what is your preference, Ms. Harris, or what have you agreed to do? What --

MS. HARRIS: The 25th, the 26th. Originally we had had the 27th, but there's been legislation reintroduced in Annapolis regarding this gas station. So we have to be in Annapolis on the 27th. So that date doesn't work, so March 3rd and March 25th.

MR. GROSSMAN: And you don't want the hearing to go forward on February 14?

MS. HARRIS: Correct, unless -- well, let me just say, unless Opponents aren't finished for some reason their case.

MR. GROSSMAN: Well, we do have to let people know whether we're going to be having the hearing that day. So --

MS. ROSENFELD: Well, frankly --

MS. HARRIS: Well, and --

MR. GROSSMAN: Well, we can cancel it a couple of days in advance, but I --

MS. ROSENFELD: Mr. Grossman, in light of the fact that there may be bad weather on the 13th --

MR. GROSSMAN: Yes.

MS. ROSENFELD: -- it seems prudent to hold the 14th; so that if either we're, we start late or if we can't hold the hearing on the 13th at all, you can hold that 14th as a backup date. And you may recall, I will have to leave early on the 13th because I have a hearing --

MR. GROSSMAN: You have to go to a new town --

MS. ROSENFELD: -- far away, in a far, far away land.

MR. GROSSMAN: So shall we do that, keep the hearing on February 14 for that reason?

MS. HARRIS: With the understanding that it, that --

MR. GROSSMAN: It's hard to cancel --

MS. ROSENFELD: That it would --

MR. GROSSMAN: It's hard to cancel without -- let me put it this way: I have to announce it at the public hearing if I don't send out formal notice --

MS. HARRIS: Yes.

MR. GROSSMAN: -- and there won't be time for formal notice to get to people if I don't know until February 13. So I will have to announce something at the public hearing if I'm canceling it. So if we come on February 13 and there's no reason to have February 14, I'll announce the cancellation at the public hearing. I'd like

to give people more notice than that, but since we usually have a set group that appears here --

MS. HARRIS: Yes.

MR. GROSSMAN: -- I guess that's the best we can do.

MS. CORDRY: Okay. That makes sense.

MS. ROSENFELD: And, you know, on Thursday, if we start late and end early, we may need the 14th to carry over witnesses. After all the time we've spent trying to keep the case moving along, I'm really wary of canceling a date that's been scheduled, knowing that things always seem to take longer than we expect.

MR. GROSSMAN: Why is that? Yes, it is true. All right. So shall we do that? We'll keep the 14th on the calendar. We'll all appear on the 13th, assuming that we're functioning weather-wise, and if there's no need to have the hearing on the 14th, we'll announce it at the public hearing on the 13th that we won't be meeting on the 14th. Other than that, we'll be meeting on February 25, February 26, as previously noticed, and then we'll send out additional notices for March 3, which is a Monday, and March 25, which is a Tuesday, 2014.

MS. ROSENFELD: You said March 25, right --

MS. ADELMAN: Yes.

MS. ROSENFELD: -- not March 4? Okay.

MR. GROSSMAN: That's what Ms. Harris is telling me.

MS. ROSENFELD: Yes.

MR. GROSSMAN: Okay. So everybody's on board with that?

MS. HARRIS: Yes.

MR. GROSSMAN: Hearing no nays, assume that's the case. Now, the next question is how the parties want to handle closing arguments, briefs, and the submission of suggested conditions. As I indicated in my e-mail response to Mr. Silverman and as I've said at the hearing before, no matter what I recommend here, I'm going to attach conditions that I would recommend if the Board of Appeals decides to grant the special exception and also conditions that the parties may wish -- even if I don't recommend them, I guess I would attach them as some kind of an appendix. And so there has to be some -- the parties have to get together and see which, at least prior to the final hearing date that we meet, decide which conditions they are agreeable to -- and they should be submitted on a list of jointly recommended conditions -- and then conditions that the applicant wishes that the opposition does not agree to and, vice versa, ones that the opposition wishes that the applicant doesn't agree to.

So what's, for that part of it at least, what's a

good day to discuss those conditions? Should we, that be the last day, such as March 3, and we'll have March 25 in case it's necessary? Does that make sense?

MR. GOECKE: I think that makes sense.

MS. HARRIS: Yes.

MR. GROSSMAN: All right. So let's assume that'll be, March 3 will be a day that we're going to look at those conditions, and so I'd ask that the parties get together and submit something at least a week before that. So that would be --

MR. SILVERMAN: The 24th.

MR. GROSSMAN: Okay, 24th of February. So I guess you can submit it at the, at our meeting scheduled for February 24. That would be the joint list and then the parties' --

MS. HARRIS: Mr. Grossman, we don't --

MR. GROSSMAN: -- not-agreed-to conditions.

MS. HARRIS: We had said that the hearing dates are the 25th and 26th, not the 24th.

MR. GROSSMAN: Oh, I'm sorry. Oh.

MS. CORDRY: But he's saying we should be trying to meet or something and discuss a week before.

MS. HARRIS: No, but then he said we submit.

MS. CORDRY: Oh, I'm sorry.

MR. GROSSMAN: Right. I'm sorry. Yes, because I

have -- the 24th is a calendar day for our hearing.

MS. CORDRY: No.

MS. HARRIS: Right, but then we canceled that because Dr. Jison isn't --

MR. GOECKE: Is not available.

MS. HARRIS: -- available that day.

MS. CORDRY: So it's the 25th.

MR. GROSSMAN: Oh, I see. So you, I -- sorry, I didn't catch that --

MS. HARRIS: No, I'm sorry.

MR. GROSSMAN: -- as a cancellation. Okay. So we canceled the 24th. The only problem with the 26th is that that is a Wednesday and we don't have the hearing -- we don't have this room on Wednesdays --

MS. ROSENFELD: Oh.

MR. GROSSMAN: -- and I'm not sure, I haven't checked, I'm not sure that we can get the Council's room on that day. So that may be up in the air. The --

MS. CORDRY: Would the auditorium --

MR. GROSSMAN: -- Board of Appeals meets here on Wednesdays.

MS. CORDRY: Yes. Would the auditorium be available or --

MR. GROSSMAN: I don't know. I'd have --

MS. CORDRY: Okay. All right.

MR. GROSSMAN: -- we'd have to check.

MS. CORDRY: Okay.

MR. GROSSMAN: So --

MS. ROSENFELD: Well, if that's the case, Mr. Grossman, maybe we should be looking at yet another date at the end of March after the 25th as an alternative to February 26th if the room is not available.

MR. GROSSMAN: What about Friday the 28th of March as a possible date?

MS. ROSENFELD: That looks okay for me.

MS. HARRIS: That works.

MR. GROSSMAN: Okay.

MS. HARRIS: Yes, that would work.

MR. GROSSMAN: Okay. So we will see whether we have a room available on the 26th of March, I'm sorry, of February.

MR. SILVERMAN: 26th.

MR. GROSSMAN: Right, or that was the date that was suggested in lieu of the 24th. And --

MS. ROSENFELD: And we're canceling the 24th, right?

MR. GROSSMAN: That's the question, but I guess -- I guess that'll be the case, but right now that's what I'll be checking into, room availability and so on. So, yes, that's the likelihood. Well, I guess that's, are we talking

about -- you said adding on another one at the end of March. There is, I guess, the possibility --

MS. ROSENFELD: Yes.

MR. GROSSMAN: -- of February 28. Is that --

MS. ROSENFELD: I think they were unavailable. Wait. Wait. Let me see.

MR. GROSSMAN: Well, that's the question. What --

MS. ADELMAN: The 27th they're unavailable.

MS. ROSENFELD: No, Mr. Grossman, we'd be looking at the 25th and the --

MR. GROSSMAN: Which month? Name a month.

MS. ROSENFELD: February 25th, 26th. I just --

MR. GROSSMAN: Well, the 26th is the one that's up in the air --

MS. ROSENFELD: Up in the air.

MR. GROSSMAN: -- because we don't know about a room, but --

MS. HARRIS: Another thing that we're wondering, but I have to check with Mr. Guckert, is, is he available the 24th, again, recognizing that they have --

MR. GROSSMAN: 24th of?

MS. HARRIS: February.

MS. ADELMAN: February.

MR. GROSSMAN: Okay.

MS. HARRIS: So we could add that back on and

start with his rebuttal on the 24th --
MR. GOECKE: Before Dr. Jison testifies.
MS. HARRIS: -- before Dr. Jison. I can e-mail him now and hopefully get an answer.
MR. GROSSMAN: All right. Well, we can discuss this again later on today. Lunchtime --
MS. HARRIS: Yes.
MR. GOECKE: Yes.
MR. GROSSMAN: -- why don't you all bring that up, and then we'll figure out what to do about it. All right. Why don't you discuss it offline so we don't take more hearing time on this, and we'll --
MS. ROSENFELD: Okay. And --
MR. GROSSMAN: -- talk among yourselves, as they say.
MS. ROSENFELD: -- not to overly complicate things, but I'm here for preliminaries this morning, and I will be leaving for the rest of the day, and Ms. Cordry will be handling Dr. Breysse and Ms. Savage's testimony today. So --
MR. GROSSMAN: Okay.
MS. CORDRY: And I will keep notes on her availability.
MR. GROSSMAN: Well, then if you're leaving early -- well, today is not your day that you're --

MS. ROSENFELD: Today is not, that's right. That's right.
MR. GROSSMAN: Right. Right. Okay. All right. Let's move on to the --
MS. ROSENFELD: But I will be in touch with Ms. Cordry so we can coordinate calendar even if I'm not here.
MR. GROSSMAN: All right. Let's move on to the next question we were discussing which is how the parties want to handle closing arguments and briefing. Applicant, what's your preference about that? Do you want --
MS. HARRIS: What we --
MR. GROSSMAN: -- an oral closing argument? Do you --
MS. HARRIS: No. We believe that written closing is probably more appropriate given the length and complexity of this hearing. And what we had suggested to Opponents, but we have not yet heard back from them, is a closing schedule that would have Applicant submitting their closing brief four weeks after the close of the record, Opponents preparing a reply brief two weeks after that, and then Applicant having an opportunity to submit another --
MR. GOECKE: Rebuttal.
MS. HARRIS: -- a rebuttal, excuse me, a rebuttal brief two weeks after that.

MR. GROSSMAN: Well, it wouldn't be after closing of the record because the briefs will be part of the record.
MS. HARRIS: Oh, right. I'm sorry, after the last hearing date, my apologies.
MR. GROSSMAN: All right. Ms. Rosenfeld, do you want to be heard on that?
MS. ROSENFELD: We had proposed that both parties simultaneously submit closing statements 30 days after the last hearing date.
MR. GROSSMAN: At one point, you said you had a desire to make an oral case.
MS. ROSENFELD: I do. I do, and my recommendation would be that that either be some number of days after the final submissions are made or some number of days after the last hearing date, but absolutely, I would like to have an oral summation.
MR. GROSSMAN: And how much time do you want for that?
MS. ROSENFELD: I think 45 minutes would be reasonable.
MR. GROSSMAN: All right. Now, you didn't indicate a preference for that, but I'm not going to deny Ms. Rosenfeld the opportunity to make an oral pitch. So I presume you want the opportunity to also make an oral pitch. So --

MS. HARRIS: Either an oral pitch or the opportunity to reply to that, rebut that in written, in a written statement after her oral pitch. I mean, traditionally, if this were, quote, a normal hearing, the applicant would make their closing argument, the opponents would reply, and then we'd be able to rebut that and --
MR. GROSSMAN: Right.
MS. HARRIS: -- that's the way it would go. And so therefore whether -- whatever form it takes I think that format is important to keep.
MR. GROSSMAN: All right. But assuming, as we -- or as I've already said, I'm going to let Ms. Rosenfeld make her closing argument. I don't know. How much time -- do you wish to, Mrs. Adelman, do you wish to make a closing oral argument, or do you wish to submit something?
MS. ADELMAN: We were definitely going to submit a written closing, but I'd like to reserve the right to do an oral also, and it would probably be 30 minutes.
MR. GROSSMAN: All right. I may want to cut the size of these oral arguments down, because now we're talking about a long oral argument. I mean, when the Council has oral argument on rezonings, they generally give 20 minutes to a side.
MR. GOECKE: Yes.
MR. GROSSMAN: So maybe you should gauge it down a

little bit in terms of the length --
MS. ADELMAN: Okay.
MR. GROSSMAN: -- of oral arguments here. Rather than 45 and --
MS. ROSENFELD: They also --
MR. GROSSMAN: -- 45 minutes and --
MS. ROSENFELD: They also typically aren't trying to sum up a case that's quite as voluminous as this one.
MR. GROSSMAN: I agree. I agree. So I'll take that into account.
MR. GOECKE: But the Court of Special Appeals deals with cases like this, and they apply the same restrictions to --
MR. GROSSMAN: I mean, that's, a 45-minute plus a 30-minute, that's a lot of oral argument for essentially -- so, anyway, we'll have another hearing. So you can all give me a final figure on that, but -- and then there's also a question. I guess what we would want to do is we'd want to give the applicant equal time to the opposition, and so then you'd be talking about another hour and 15 minutes from, and we don't know about -- Ms. Duckett is not here; so we don't know how much time, if any, she wants to make in oral argument. So --
MS. CORDRY: We can certainly check. My --
MR. GROSSMAN: All right.

MS. CORDRY: -- assumption would be she's not, but we can check on that.
MS. ADELMAN: My assumption would be that also.
MS. CORDRY: And, actually, she will be here later today, I believe. So you can --
MS. ADELMAN: Yes.
MS. CORDRY: -- check that at that time.
MR. GROSSMAN: All right. Well, I guess that we should assume that whichever is the last hearing date, if it's March 3, that would be the closing argument date. In other words --
MS. ROSENFELD: March 3?
MS. CORDRY: No.
MR. GROSSMAN: It would occur at a scheduled hearing date, if it's March 3 or March 25. Whatever is that final date that we actually have to appear here would be the date on which you'd make your closing argument.
MS. CORDRY: I thought we were talking about doing the argument following the written material. So that it would be that, you know, essentially, the written arguments would be in and it would be a chance to state them and then if you had any questions back from them and so forth, as opposed to before you did the written closings.
MR. GROSSMAN: Applicant, what do you feel about that?

MR. GOECKE: That was my understanding as well.
MR. GROSSMAN: All right. Well, we can do that too, I suppose. We can have, but that would require another -- we'd have to have a public session noticed --
MS. CORDRY: Right.
MR. GROSSMAN: -- for the oral arguments.
MS. CORDRY: I mean, I think we were thinking like a week or two weeks after the last papers went in would be -- then have the oral arguments scheduled.
MR. GROSSMAN: You're trying to make me break the record here, and I don't want to break the record.
MS. ROSENFELD: We're really not trying to do that --
MS. ADELMAN: That's true.
MS. ROSENFELD: -- I can promise you that.
MR. GROSSMAN: All right.
MS. ADELMAN: So where are we now?
MR. GROSSMAN: And how much, it was suggested -- Ms. Harris, you suggested 30 days after the last hearing date to, for the submission of --
MS. HARRIS: Yes, and I -- that part, yes.
MS. ROSENFELD: Yes. I think we both agree on that.
MR. GROSSMAN: All right. And what about that format that was suggested -- that is, Applicant submits any

brief, responded to by the opposition, and an opportunity for a reply from the applicant?
MS. ROSENFELD: I really can't argue with that format that the applicant followed by the opposition followed by the applicant for rebuttal, but if the applicant is going to have four weeks to prepare their written closing, we certainly should have four weeks as well. The record is the equal size for both sides of the parties, and I don't see why they would have additional time to prepare their written statement and give us two weeks to respond to their --
MS. HARRIS: Well, Mr. Grossman, if I could, it's not exactly that they're only getting two weeks. I would look at it as they're actually getting six weeks. I mean, none of -- the issues in this case are not any secret, and presumably, Opponents would be working on their brief for six weeks, not starting on it after they've received ours after four weeks.
MS. ROSENFELD: Knowing human nature --
MR. GROSSMAN: Well, we try not to take account of human nature in these proceedings. How --
MS. ROSENFELD: Let's split the baby and make it three weeks, could we?
MR. GROSSMAN: All right. Why don't we do this --
MS. ROSENFELD: You know, this isn't --

MR. GROSSMAN: -- why don't we say 30 days for the applicant, 20 days for the opposition after that's filed, and then 10 days for any reply? How's that?
MS. ROSENFELD: I can live with that.
MS. HARRIS: And so can we. And the 30 days commences after the last --
MR. GROSSMAN: Right, after the last --
MS. HARRIS: -- hearing date of the witnesses.
MR. GROSSMAN: -- date on which evidence is taken.
MS. HARRIS: Yes.
MR. GOECKE: And then the oral arguments would take place 10 days after the rebuttal brief is filed?
MR. GROSSMAN: Yes. Well, we'll figure out the specific date after consulting the parties as to what's a good date for them --
MR. GOECKE: Okay.
MR. GROSSMAN: -- but that would generally be, it could be any time after the last, the reply brief is due.
MS. HARRIS: And, Mr. Grossman, one more thing in terms of the written closing statement, are you -- is there going to be a page limit? Would you like a page limit?
MR. GROSSMAN: Three pages.
MS. HARRIS: Then we need 40 days.
MR. GROSSMAN: What do you all think about that, page limits? There isn't anything in the rules that covers

this. So --
MS. ROSENFELD: Right. Right.
MR. GROSSMAN: -- so do you have a, do you have a feeling about that?
MS. HARRIS: I think there should be a page limit, and now you're going to -- the next question is, how many pages?
MS. ROSENFELD: Is how do we feel --
MR. GROSSMAN: How many pages?
MS. CORDRY: Why don't we come back to that?
MS. HARRIS: Thirty pages. That's --
MS. ROSENFELD: This is a very long case with a lot of very technical information in it. The reports alone are hundreds -- we have thousands, literally thousands of pages of scientific reports in this case. Now, the point of the summation is to distill it into a manner that would be helpful to the Hearing Examiner in assessing the evidence. How we arbitrarily put a page limit on that at this point in the proceeding is very difficult to see, and frankly, I don't see what the need for a page limit would be. I mean, what's the meritorious basis for --
MR. GROSSMAN: Well, why do courts put page limits --
MS. HARRIS: Right.
MR. GROSSMAN: -- on briefs? What's the

meritorious basis for that? It tries to make people hone it in to things that are important in the case. There's been an awful lot of evidence here that is very important, and there's been some evidence that is really not going to directly bear on anything I'd recommend because it's too peripheral to some of the, so many central issues in the case. So there is an aspect of that. I'm afraid that if I put a page limit on, somebody's going to submit type that's too small for me to read and --
MS. HARRIS: Circuit Court rules.
MR. GROSSMAN: Right. I'll tell you what. I'm not going to put a page limit on it, but let's use some judgment as to what's really going to be effective, what I'm going to be -- what's going to be useful to address, because it makes sense from the perspective of the parties as well. There's no point in writing so much that obfuscates the real central issues in the case. So I would suggest that you address yourself to those central issues. Don't add appendices and that kind of thing because that's, you know -- the evidence will be the evidence in the case. So this is just argument, the briefs.
All right. Let's see what else. All right. Let's turn to the questions raised regarding Ms. Cordry's, quote, summary that's Exhibit 431(b), as in boy. Mr. Goecke, you had raised objections to that exhibit coming

in. Oh, the other thing is, I guess we also ought to discuss the questions of handling the admission of exhibits. There are many exhibits here, and I had said at the end of the case we're also going to discuss which exhibits are to be admitted and which would not be admitted formally into the record. So far they're, in effect, marked as exhibits but not necessarily admitted, and usually we do that at the end.
Early on in the case, the applicant submitted a long list of objections to exhibits, and I suggested that that list of objections was not directive in the sense that I would recognize, in that they were, they were handling -- most of them were objections to essentially advanced descriptions of the expected evidence that was to be submitted by the opposition, and I asked that that be reconsidered and then resubmitted, honed down to what is truly objected-to exhibits.
So what, what would be the appropriate day that parties agree to that we discuss the exhibits? And I would suggest that that would be the same day as we discuss the proposed conditions, and so one week in advance of that.
MS. ROSENFELD: And did we have a tentative date for that one week in advance, or do we know?
MR. GROSSMAN: Yes. I think it was February 24. Right? Is that what we --

MS. ADELMAN: 25.
MR. GROSSMAN: 25? Let me see. No. I think it was February 24 because we had March 3 it was going to be discussed.
MS. ROSENFELD: Frankly, Mr. Grossman, given the fact that they're not even going to have started their rebuttal testimony at that point and I'm anticipating that there will be at least some exhibits introduced -- we don't even know which witnesses yet -- that it would be more appropriate to do that at the close of all the evidence.
MR. GROSSMAN: Well, I would agree it would be appropriate at the close of all the evidence. I'm afraid that we may be squeezing ourselves on a day, that's all. We don't know which day that's going to be given our flexibility here and how we're scheduling a day. Why don't we do this: Let's keep that the way we had it, and then as to additional exhibits, we'll handle, if there are additional rebuttal exhibits, we'll handle them, you know, separately at that point. At least we'll get an organized submission of any objections by both sides on February 24, and then we can discuss them all on March 3, will be the goal.
MS. ROSENFELD: So February 24th we're looking at proposed conditions and exhibit objections?
MR. GROSSMAN: Right. And --

MS. HARRIS: So it seems, though, that the date of March 3rd is going to be devoted primarily to those two items or at least the morning --
MR. GROSSMAN: It may be. If we need --
MS. HARRIS: -- as opposed to having a witness testify.
MR. GROSSMAN: Well, we'll see how that works out.
MS. HARRIS: Okay.
MR. GROSSMAN: I mean, I'll be flexible about how we do it. I want to make sure we get all the evidence in. So if we have to do that at one of the later dates that we've talked about --
MS. HARRIS: Sure. Right.
MR. GROSSMAN: -- we'll do that.
MS. HARRIS: Okay.
MS. ROSENFELD: February 24th is just the day you want us to submit --
MR. GROSSMAN: Right.
MS. ROSENFELD: -- that information? We're not --
MR. GROSSMAN: Right. So we're trying to --
MS. ROSENFELD: -- going to argue on that day?
MR. GROSSMAN: -- we're trying to do it in case we have -- in case March 3 turns out to be a date available to have the discussion, we'll have the submission of the proposed conditions, and we'll have the submission of the

objections. I'm generally pretty liberal about what I allow into the record in terms of exhibits, and I address the weight to be given to each as I consider the case later on. But to the extent that you have objections, I will certainly listen to them and rule on them.
Okay. Going back to Ms. Cordry's summary, so did you want to be heard on that, Mr. Goecke?
MR. GOECKE: I would, Mr. Grossman. Thank you. Right, you had raised questions in your e-mail that I said were our concerns, and they remain our concerns. And basically, what we have here is a document labeled a summary but, as you pointed out, contains a lot of opinion and a lot of argument by someone who is not a qualified expert on these areas. And to the extent that Ms. Cordry or members of the opposition have criticisms of Mr. Sullivan's methodology, we believe the appropriate time to address them was either on cross-examination or through Dr. Cole's testimony. And now they're saying that Dr. Jison or Dr. Breysse may rely on this summary created by a layperson, and it could be very prejudicial to the applicant because then suddenly you've got experts talking about a laywitness's summary based on her analysis of the transcript and of records. And there's been no indication that the doctors have prepared this document at all, that they reviewed the transcripts, that they've, you know, reviewed

these other materials that Ms. Cordry is summarizing, and we just think it would be objectionable for those reasons.
MS. CORDRY: I would say --
MR. GROSSMAN: Ms. Cordry.
MS. CORDRY: -- a couple of things. One, in terms of dealing with Mr. Sullivan, this is not the question of whether Mr. Sullivan did or not do the right thing. Primarily, this is pulling together what Mr. Sullivan said he did. So a lot of this is quoting his testimony. Then a lot of it is saying, okay, if you take that I said I was doing X and if I look at the background monitor readings, which are also already in evidence, if I apply what he said he did to the monitors, is that what appears to come up?
So it is an analysis, yes, but it's not putting in new evidence. It's not something that takes an expert -- if somebody says I picked the highest level from a monitor in an area, I don't think you need to be an expert to go look at a series of numbers and say this appears to be the highest number. Now, if somebody wants to argue differently, that's fine too, but what it's really trying to do is pull this all together. We put a lot of it in his testimony. We asked a number of these questions there, but in a number of places, you know, it's hard for someone else to go back and to ask an expert, you know, to ask one of the experts who's looking at -- when you're talking about

backgrounds and so forth, you certainly can't expect them to have to go through and try to do all of this. What it's trying to do is put in one place that they can say, look, I'm not the one who's going to decide whether -- and you decide for yourself whether you agree that these background analyses and statements are correct. What I -- what we want them to be able to say is simply, look, here's a basis to say that if you pull everything together, the backgrounds may be higher than what Mr. Sullivan was saying; or, if you use his analysis and apply it and look at what it is, it looks like he should have been coming out with different numbers. And if I look at that, then that says to me that there's a basis to look for different things.

You're still going to make the determination as to whether or not you agree with this analysis and argument. This is really trying to put it all together in one place so that it's easy for someone else to just be able to use and to say, look, rather than try to find 20 different days of testimony -- maybe not 20, it felt like 20 -- four or five days of testimony and exhibits and all these kinds of things, it's putting it all together in one place and saying here's what we did and here's what came out and here, if you look at what he said he did and how he got there and how he went from number to number to number.

MR. GROSSMAN: All right.

MS. CORDRY: And I actually see the version --

MR. GROSSMAN: I mean, I think, even in terms of your language here, what I -- I view it as more of a, more of an analysis and argument --

MS. CORDRY: Yes. Yes.

MR. GROSSMAN: -- than a summary really. And although I think that you've demonstrated a remarkable breadth of talents in various areas here, you're not qualified, or have not been qualified as an expert in meteorology, which is what is the topic of the piece. I think it might have had more direct evidentiary appeal or value if it had come in through Dr. Cole rather than as your summary, because he's your expert in meteorology, but I don't have any reason not to receive it as part of your argument.

MS. CORDRY: Right.

MR. GROSSMAN: So I consider it kind of an advance on the opposition's argument, and I would receive it as such, and in some sense, it's advantageous to the applicant to have an advance on their argument. So I'm not saying you have to send them a thank you note, but I don't think that I would reject it because I receive it as argument, which is what it is --

MS. CORDRY: Right.

MR. GROSSMAN: -- analysis and argument.

MS. CORDRY: Right. And --

MR. GOECKE: And if I may, Mr. Grossman --

MR. GROSSMAN: Yes.

MR. GOECKE: -- we have no objection to them submitting this as argument, but I thought the issue today was whether or not Drs. Breysse and Jison would be able to testify about that, and that is, that is where our objection lies.

MR. GROSSMAN: Yes. I think that's more problematic because I would not want, Ms. Cordry --

MS. CORDRY: I'm sorry.

MR. GROSSMAN: -- I wouldn't want the additional experts relying on your summary of Mr. Sullivan's testimony as part of their expert testimony because I think that that could be problematic. I think they should rely on a review of the testimony and so on, not your own view of the testimony as you've summarized it. So I think, to that extent, that that's a fair point, but I would receive your summary as part of the opposition's argument.

MS. CORDRY: And let me just say that I thought I had printed out the most recent version. I see this one still has one or two errors in it. I will print it out, and we will have the actual correct copy. No, this -- I'll get the final version submitted. Just --

MR. GROSSMAN: Okay.

MS. CORDRY: -- this one that I had submitted before has a couple of question marks in it in places where I needed to fill in exhibit numbers. I must have printed off the incorrect version, but --

MR. GROSSMAN: Okay.

MR. SILVERMAN: I just want to say that lawyers do this all the time and they don't reveal it to the other side. That's been my experience.

MR. GROSSMAN: Don't reveal? I'm sorry. I didn't catch that.

MR. SILVERMAN: The kind of summary that Ms. Cordry did.

MR. GROSSMAN: Right, and I, so --

MR. SILVERMAN: Yes, we all do that.

MR. GROSSMAN: Okay. All right then, so I think that's all the preliminary matters that I have. Any other preliminary matters? Shall we start with the applicant? Did you have any other preliminary matters?

MS. ADELMAN: Mr. Grossman, Ms. Duckett is here if you wanted to ask her about closing arguments.

MR. GROSSMAN: All right. Hi, Ms. Duckett. Welcome --

MS. DUCKETT: Pardon me? I --

MR. GROSSMAN: Ms. Duckett, on behalf of Kensington View Civic Association, are you going to want to

make an oral closing argument?
MS. DUCKETT: No.
MR. GROSSMAN: No? Okay. All right. We have discussed and the parties can fill you in on the, how we're going to handle closing briefs and so on, okay? All right. Any other preliminary matters? Ms. Rosenfeld.
MS. ROSENFELD: Yes, a couple of things. With respect to rebuttal, the applicant has indicated that they expect to call Mr. Guckert and Mr. Sullivan. Do you have any other idea what other rebuttal witnesses you might be planning so I know which of our witnesses should be here?
MS. HARRIS: We don't, but part of that is because you haven't completed your case. So depending on what we hear through the completion of your case may influence that, obviously.
MS. ROSENFELD: Okay. And the other, Cindy Holland, who sent an e-mail in several days ago, I've gone through her curriculum vitae that she attached, and I just want everybody to be aware that I will move to qualify her as an expert witness. I will --
MR. GROSSMAN: Is that --
MS. ROSENFELD: -- voir dire her. She's not our witness, she's not a Kensington Heights witness, and I don't believe she's being called by the Coalition, but I will seek to admit her, move for her admission as an expert.

MR. GROSSMAN: All right. It's unusual for us to have somebody show up and seek to qualify themselves as an expert individually, not on behalf of a group, so on, but I don't see any reason why that can't be done given, you know, if the statements are made far enough in advance to give the other side the opportunity, number one, to review qualifications and, number two, to see what the opinions are that are being offered. Now, that's the second part. She did submit her qualifications, but what her opinions are I'm not quite sure yet from what she sent. What about that aspect of it?
MS. ROSENFELD: I don't know that she has any written reports or written analysis.
MR. GROSSMAN: Yes. I mean, the --
MS. ROSENFELD: I don't expect her to -- if she has them, I'm unaware of them.
MR. GROSSMAN: Here's the thing: The statute requires, when there's a group or association offering witnesses, they do have to file certain things in advance, that 10-day rule, and -- to give the other side the opportunity to prepare. But it also contains very clear language that an individual showing up can testify without submitting anything. And so the question is, what happens if that individual is an expert, or submitting themselves as an expert, and what's the fair way to handle that? I'd say,

under the statute I can't compel it because of the way the statute is written, but I think it would be more fair if she submitted in advance a statement of what she intends to opine if she's appearing as an expert.
So I would ask, if you're communicating with her in that sense, which I think you're suggesting you are, that you ask her to do so. I'm not requiring it because, as I say, the statute has clear language that an individual can come in and testify --
MS. ROSENFELD: Okay.
MR. GROSSMAN: -- I don't think it contemplated individuals coming in and testifying as experts. So that's my kind of compromise on that.
MS. HARRIS: Two questions with regard to that. What is she -- in what area is she an expert?
MR. GROSSMAN: Real estate values.
MS. ROSENFELD: On real estate valuation.
MS. HARRIS: Okay.
MS. ROSENFELD: Basically, looking at her qualifications, they really mirror those of Mr. Cronyn in terms of her, certainly her professional background and training, to some degree.
MR. GROSSMAN: Right. Please make sure that she includes -- I suggested in an e-mail, and I sent the applicant a copy of the e-mail, that -- she initially

e-mailed me without sending copies to the other side. And so anything, any communication with me has to go to all of the participants in the hearing so that -- to ensure fairness. So I said that to her, and then her last e-mail she did include, she did cc it to the other side. Now ask her to send, make sure she sends whatever communications she has --
MS. ROSENFELD: Certainly, which brings up another question, though, which is the 10-day rule, because I would expect her to -- at the moment, I expect her to be present on the 13th to testify --
MR. GROSSMAN: Okay.
MS. ROSENFELD: -- assuming we're done with Dr. Breysse and Ms. Savage.
MR. GROSSMAN: Well, when you leave here today, since we -- as I said, I can't require it -- but when you leave here today, would you ask that she submit something, e-mail this afternoon --
MS. ROSENFELD: Okay.
MR. GROSSMAN: -- outlining the nature of, or summarizing what her opinion is, so at least to that extent, the applicant has an opportunity to review that in advance? Would that be --
MS. HARRIS: That's acceptable, but --
MR. GROSSMAN: All right.

MS. HARRIS: -- and to the extent then we review that and there's any type of information that we may want to present on cross, how does that apply in terms of the 10-day rule?

MR. GROSSMAN: Well, you may not have the 10 days, but the practical fact is that the statute for individuals doesn't give you the 10 days. They can show up and testify, as a practical matter, whenever they can be fit into the calendar. That's what the statute essentially says -- the zoning ordinance, I'm talking about.

MS. HARRIS: Right. But so my question is, though, if we have any evidence that we want to submit in connection with our cross of her, I assume that we can prepare it after we see what she's going to say and then just submit it during the hearing.

MR. GROSSMAN: Oh, yes. Yes, and I think that --

MS. HARRIS: Okay.

MR. GROSSMAN: -- right, certainly. You wouldn't have to give advance notice of that --

MS. HARRIS: Right.

MR. GROSSMAN: -- because under the circumstances you're only getting a few days, in any event.

MS. HARRIS: Okay. I just wanted to clarify that. Thank you.

MR. GROSSMAN: Okay. Any other preliminary

matters?

MS. ROSENFELD: No. Oh, one more.

MR. GROSSMAN: All right.

MS. ROSENFELD: I don't believe Ms. Cordry's résumé is in the record, and I do want to introduce that as an exhibit.

MR. GROSSMAN: All right.

MS. HARRIS: But Ms. Cordry, I just want to clarify, is not an expert on anything that --

MS. ROSENFELD: She's not an expert.

MR. GROSSMAN: She hasn't testified as an expert.

MS. ROSENFELD: She hasn't testified as an expert, but to the extent that it goes to the weight of her testimony on any of these issues, I do want it.

MR. GROSSMAN: Thank you. So this will be Exhibit 438, résumé of Karen Cordry.

(Exhibit No. 438 was marked for identification.)

MS. ROSENFELD: And that's all of my preliminaries. Thank you.

MR. GROSSMAN: All right. Ms. Adelman, did you have any preliminary matters?

MS. ADELMAN: Well, I'm just, I have three individual witnesses, and I'm just wondering how I'm going to work them in.

MS. ROSENFELD: If --

MR. GROSSMAN: Well, we'll try to work them in after we complete the expert. I mean, I want to make sure that we get -- Dr. Breysse has been sitting here through our exciting --

MS. ADELMAN: Exactly.

MR. GROSSMAN: -- preliminary matters, but we'll --

MS. ADELMAN: Yes, right. So I was hoping for one today and two on the 13th, but I guess we'll have to see.

MR. GROSSMAN: Do you want to see how Dr. Breysse's testimony goes --

MS. ADELMAN: Yes.

MR. GROSSMAN: -- and how long that takes and so on, and then we'll --

MS. ADELMAN: Yes, sir.

MR. GROSSMAN: Okay. All right. Ms. Duckett, did you have any preliminary matters?

MS. DUCKETT: No, sir.

MR. GROSSMAN: Okay. All right. Then I guess we're ready to roll, as they say, slow roll. Okay. Then your first witness?

MS. CORDRY: Dr. Breysse.

MR. GROSSMAN: Would you be so kind to --

MR. BREYSSE: Can I get some water?

MR. GROSSMAN: Water? Yes. You have some?

MR. BREYSSE: I haven't started, and I'm already anticipating being thirsty.

MR. GROSSMAN: I don't know if we let experts have water. I'm not sure that that's a --

MR. BREYSSE: If it's red wine, it might be better.

MR. GROSSMAN: Would you state your full name and address for the record, please?

MR. BREYSSE: My name is Patrick Nolan Breysse, and I live at 11963 Harford Road, Glen Arm, Maryland 21057.

MR. GROSSMAN: Would you raise your right hand, please?

(Witness sworn.)

MR. GROSSMAN: All right. You may proceed.

MS. CORDRY: All right. I would like to state for the record, I grew up in Glen Arm, Maryland, but I did not know Dr. Breysse until we started this case.

MR. GROSSMAN: I don't even think there's a requirement that you not know him, but that's okay.

MS. CORDRY: All right.

DIRECT EXAMINATION

BY MS. CORDRY:

Q Can you state your business address?

A 650 North Wolfe Street, Johns Hopkins University

Bloomberg School of Public Health, Baltimore, Maryland 21205.

Q Okay. And I'd like to start with asking you to describe your education and experience.

MS. CORDRY: And this is already in the record, but I have provided copies.

MR. GROSSMAN: Exhibit 88C --

MS. CORDRY: It's --

MR. GROSSMAN: -- Dr. Breysse's --

MS. CORDRY: Right.

MR. GROSSMAN: -- curriculum vitae.

MS. CORDRY: Right, either 80(c) or 88(c). I believe we did this twice. Do you have the copy of it there?

MR. GROSSMAN: I have 88(c) here.

MS. CORDRY: Okay, same difference.

THE WITNESS: So I have a high school degree from Blanchet High School in Seattle, Washington, where I grew up, and a B.S. in environmental sciences from Washington State University. In 1978 I moved to Baltimore to get a master's degree in -- focusing on occupational safety and health at the Johns Hopkins Bloomberg School of Public Health. I intended to stay here for one year but managed to stay for my doctoral training, and I completed my Ph.D. in the environmental health engineering program with a focus on

occupational safety and health and air pollution. And after completing my Ph.D., I did a year of study as a postdoctoral fellow at the British Institute for Occupational Medicine in Edinburgh, Scotland, at which time I returned to Johns Hopkins as a, as an assistant professor. And so since I've been on the faculty since 1986, I've risen through the ranks from assistant professor to associate professor, and now I'm a full professor.

BY MS. CORDRY:

Q Okay. And you originally received your degree as an, excuse me, as an industrial hygienist, I believe. Can you describe a little bit about what kind of work an industrial hygienist does?

A So an industrial hygienist is a person who's trained to evaluate the safety and health factors in the workplace. This was in a period of time right after the Occupational Safety and Health Act was passed in the 1970s. So there's a growth in the need for people with specialized training on how to monitor the air in the workplace, how to set safety hazards in the workplace, how to help employers comply with the new Occupational Safety and Health Act, and it was an exciting period of time. And I began my career as an industrial hygienist, looking at factors in the workplace, focusing on air pollution, and then later in my career, as funding opportunities and the air pollution began

to grow, I started applying my, my, the same tools to assessing indoor and outdoor air quality outside the workplace.

Q Okay. At Johns Hopkins, can you tell us where precisely, what department you're employed at?

A So I'm in the Department of Environmental Health Sciences.

Q Okay. And a particular division there?

A Well, we're actually in the process of reorganizing ourselves, but we have a new department chair, and -- but I'm currently in the Division of Environmental Health Engineering.

Q Okay. And what does that division deal with?

A So in the -- the roots of the division were back, historically, there was a discipline called sanitary engineering, and sanitary engineers dealt with a range of things, including air quality and sanitation issues with water supplies, wastewater disposal. And so the division used to have a lot of engineers with sanitary engineering training, but as we've evolved over time, Environmental Health Engineering has two, at Johns Hopkins Bloomberg School of Public Health, has two major focuses: there's a group of us that deal with air pollution issues, both in the workplace and not in the workplace, and people who deal with water quality issues, both in terms of water supply and

wastewater treatment.

Q Okay. Are there other assignments at Johns Hopkins besides, that you've held, besides this position in the Division of Environmental Health Engineering?

A Well, I've had a number of administrative responsibilities. So I was the director of the division for five or six years. I stepped down as director of the division when the dean asked me to lead the school's Appointment and Promotions Committee, which was a big job and I didn't feel like I could do both; so I stepped down at that. I've led a number of centers. I participated in the Center of Leadership. We have a Center for Childhood Asthma in the Urban Environment where I'm the co-director of the center. I've led other grants and program projects and had other committees that I've served on.

Q Okay. And I see on your résumé you're listed as a professor of medicine and a professor of chemical and biomolecular engineering. Are those separate degrees, or are those --

A No. At -- you know, when you collaborate with faculty in other divisions of the university, other parts of the university and you get involved in their academic programs, it's not uncommon for them to offer you a joint appointment. So I have a joint appointment in the School of Engineering because I'm doing a lot of work that's

engineering-related, and I have students that I co-mentor with faculty in the School of Engineering, and I also do a lot of work with faculty in the School of Medicine, particularly in this case the Division of Pulmonary and Critical Care Medicine, and as a consequence, I've went through their kind of process for assigning kind of faculty appointments. And I'm happy to say I have joint appointments in those two other parts of the university as well, but my primary appointment is in the School of Public Health in the Department of Environmental Health Sciences.

Q And can you describe briefly the, generally, the research areas you were working in at Johns Hopkins over the last 10 years, let's say?

A So I've specialized in the last 10 years on indoor and outdoor air quality and health both to children and adults --

Q Okay.

A -- and in the United States and around the world. So I have a number of studies globally. You mentioned China. We do air quality studies in China as well as Peru and Mongolia, parts of the Caribbean, in Baltimore City, in Yakima, Washington, in Appalachia. So we have studies around the, around the country and around the world.

Q Do you deal with determination of emissions and exposures, risk levels, those kinds of things?

A So my major contribution to the large body of research is, is that I provide expertise on how to measure what people are exposed to, and sometimes you model it, sometimes you measure it. So there's ways to directly measure exposure, there's ways to estimate what people are exposed to, and then you use that information, along with somebody who does a health assessment, to try and make decisions about whether there's a relationship between what people are exposed to and what sort of health you might be investigating, whether it's childhood asthma or some more research, recent research on adults with chronic obstructive pulmonary disease. And so we're interested in how does air pollution modify the morbidity amongst childhood asthmatics, how does air pollution affect whether someone becomes an asthmatic or not, how does air pollution make COPD worse or not in a person who has that disease.

Q Okay. Now, we've provided your entire CV. So we're not going to go through this line by line since it's 23 pages long, but can you tell us how many scientific articles you've been listed as an author on on your CV?

A Oh, currently somewhere around 180. It might be 181, 182.

Q Okay. And can you estimate how many of those deal with the topic of health effects resulting from exposure to pollutions relating to vehicular emissions?

A It's hard to put an exact number. Maybe in the last, you know, four or five years, probably 20, 20 or so publications that related to that in some way or another.

Q Okay. And in addition to presenting your own studies, do you have a role in your various positions in reviewing papers prepared by others?

A So I review other people's works in a number of venues. Right? So I certainly review papers for journals. Right? So the point of the realm for someone like myself is publishing something called a peer-review journal, and it only works if other people agree to peer review other people's work. So I review, you know, five or six articles a year. I get asked to review a lot more but that's about all my time can bear. I review grant proposals to do research that are based on other people's kind of assessment of the science, as well, for the EPA, for the National Academy of Sciences, for the National Science Foundation, as well as other kind of international research bodies as well. So there's lots of places where I review people's work and comment on its --

Q Okay. And I --

A -- on its strengths and weaknesses.

Q And I would note that's on page 5 and 6 of your CV. Are you a member of professional societies?

A I'm a member of a handful of professional

societies. I would join more if the university would pay, but unfortunately, it comes out of my, comes out of my pocket. So currently I think I'm a member of the American Society, I mean, the American Industrial Hygiene Association, the American Conference of Governmental Industrial Hygienists. I'm a member of the Society for Exposure Science and Environmental Epidemiology, and I'm a member of the Environmental Epidemiology Society; I can't remember the exact name of it.

Q Okay. Have you had a leadership role in any of those societies?

A Oh, I was on the board of directors for the American Conference of Governmental Industrial Hygienists, and I served as the chair of the board of directors for a one-year period for that organization.

Q And have you served on advisory panels to government agencies?

A Numerous advisory panels. It's not uncommon to help the government through the National Academy of Sciences, and I've served on a number of National Academy of Sciences committees. Those are, generally, pretty prestigious invitations. They're a lot of work, but you don't like to turn them down. And I've served on other kind of ad hoc review communities. You know, for example, the Department of Energy was interested in worker exposures in

Hanford, Washington, in the tank farms, and I was on an advisory committee, assessing kind of the practices out in the state of Washington for a number of years.

Q Okay. And I would note that those appear to be listed at page 3 and 4 on your CV. Okay. And have you been retained as a consultant with respect to your scientific expertise?

A On occasion. I don't do a lot of consulting because my full-time job keeps me too busy, and so I don't get into too much relationship maintenance deficit with my wife, I don't do a lot of outside stuff, but I do do some consulting.

Q Okay. And I see on your CV that there's a number of ones listed on pages 4 and 5, both for governmental agencies and for private firms. With respect to the private firms, what kind of consulting would you have done there?

A So I think it would vary, and what page did you say those were on?

Q Those are on page 4.

MR. GROSSMAN: Refresh my memory.

THE WITNESS: You know, for academic purposes, once you put something on your CV, it stays there forever. So, you know, I've done, I've done work, for example, with IBM early in my career, looking at setting up a medical records system program. I did work with Baltimore

Gas/Electric, helping them look at power lines, exposures to people who live alongside power lines. I gave some advice to Johnson & Johnson about the health concerns possibly of some of the products that they're putting in people's homes. They're worried about whether the air fresheners, for example, with the perfumes and stuff in it, might be bad for kids with asthma. So we talked to them about it. I've consulted with the fraternal order of police on health effects of a siting of a police facility next to a hazardous waste site. So those are, those are some of the types of things that I would do --

BY MS. CORDRY:

Q Okay.

A -- over the years, but this represents, you know, 20 or 30 years' worth of potential things.

Q Have you been retained as an expert to participate in prior litigation?

A You know, I've provided advice on a couple occasions for legal lawsuits. I've never testified on behalf of anybody in a legal lawsuit. I've testified at a, at a zoning hearing before in Harford County, Maryland, on one occasion, but other than that, I haven't done a lot of expert testimony.

Q Have you been deposed?

A I've been deposed on a couple of occasions.

Q Okay. And were those in connection with these cases where you were retained as an expert?

A One was, yes, and one was not. One was, when I served as the chairman of the American Conference of Governmental Industrial Hygienists, the agency was sued by a number of industries about overstepping their boundaries in terms of creating standards for workers that they thought were not fair, and as part of those lawsuits, I was deposed, and I also testified in Congress about that.

Q Okay. All right.

MS. CORDRY: I'd like to present Dr. Breysse as an expert in the areas of industrial hygiene, epidemiology work, generally and specifically with respect to health issues relating to exposures to --

MR. GROSSMAN: Hold on. Slow down.

MS. CORDRY: Sorry.

MR. GROSSMAN: Industrial hygiene?

MS. CORDRY: Epidemiology generally --

MR. GROSSMAN: Hold on.

MS. CORDRY: -- and specifically --

MR. GROSSMAN: Epidemiology.

MS. CORDRY: -- with respect to health issues relating to exposures to vehicular emissions, and also in the review and evaluation of scientific studies and research, including, particularly, the EPA air quality

standards and the studies relating thereto.

MR. GOECKE: I'm sorry. Could you say the last one again?

MS. CORDRY: The EPA National Ambient Air Quality Standards and the studies relating to those standards.

MR. GOECKE: And I'm sorry. What is the expertise on that?

MS. CORDRY: The expertise is in the standards themselves and the kind of studies that were used to go into making up those standards.

BY MS. CORDRY:

Q I guess I might ask one other question, say one other question before I do that, which is, are you -- do you read other literature in the area dealing with these areas of air pollution and vehicular emissions, the sort of thing you do in your studies and --

A As much as I can, but there's a mammoth volume of literature on the topic, but I try to keep on it as best as anybody can.

Q Okay.

MR. GROSSMAN: So if I understand it, you're offering Dr. Breysse as an expert in industrial hygiene, epidemiology regarding health issues as to vehicular emissions, and the standards --

MS. CORDRY: And generally, with respect to review

and evaluation of scientific studies and research.
MR. GOECKE: So those two are subsets of epidemiology?
MR. GROSSMAN: Standards for air quality --
MS. CORDRY: No.
MR. GROSSMAN: -- for setting air quality standards, and review and --
MS. CORDRY: I would say the review is a separate part that -- as a person who does peer reviews, who evaluates proposals, so that he has an expertise in evaluating scientific studies, generally.
MR. GROSSMAN: Okay. And before I allow Mr. Goecke to question you on your expertise, let me just ask you a question. You've said you testified once as an expert in Maryland -- in Harford County, I think you said -- and what was the area of expertise that you were -- I take it you were admitted as an expert, you were accepted as an expert by the zoning authority there?
THE WITNESS: Yes.
MR. GROSSMAN: And what was the area of expertise that they certified you in?
THE WITNESS: It was very similar. It was -- there was a sand and gravel operation that wanted to expand, and as part of that expansion, they wanted to change the traffic patterns in terms of the trucks coming in and out.

And there was an issue about increased truck traffic and air pollution in the neighborhood around the sand and gravel operation, and in particular, there was a school that would have been potentially impacted. And so my testimony was on the health impacts of the changes in traffic pattern that might be impacting the neighborhood and particularly the kids at the school.
MR. GROSSMAN: Okay. All right. Mr. Goecke.
MR. GOECKE: Thank you. Dr. Breysse, you testified that sometimes you will do air modeling to evaluate a situation. Talk, tell us about your background in air modeling. What training have you had? What experience?
THE WITNESS: Okay. So let me qualify that a little bit. I usually have my students do the air quality modeling for me. I don't run the models myself anymore, but we, we often publish --
MR. GROSSMAN: Did you say you don't run the models yourself anymore?
THE WITNESS: Directly myself, right.
MR. GROSSMAN: You said anymore?
THE WITNESS: Yeah.
MR. GROSSMAN: But then you did at one point?
THE WITNESS: At one point, a long time ago. So in research studies we often want to look at, you know, what

the air pollution might be in an area where there's no measurements. And so, for example, we published a paper last year in the Journal of Environmental Health Perspectives where we looked at the air quality data and we modeled what the exposures would be across the whole country and we overlaid that with the health data we might predict from looking at risk factors for health. And then we published a paper, looking at the assessment of the health impact of ozone across the country if the EPA met different levels of -- set the standard at different levels, trying to imply kind of where the health benefits would exist and how big those health benefits would be. So that was an example of a modeling experiment.
So, in addition, we're doing some research now where we're looking at the effect of air pollution and climate change. And so we're modeling the air pollution over time, and we're modeling the heat, the changes in temperature over time, and we're trying to estimate whether we think there's going to be a greater impact from air pollution associated with changes in temperatures associated with climate change.
MR. GOECKE: And is that on a regional basis, a --
THE WITNESS: Yeah, it's usually on a regional basis, a larger-scale basis. These are, these are national models. In another case, in Nepal we're looking at

emissions from homes that burn biomass, and we're trying to estimate how much black carbon is being emitted as a climate change agent. And we're using satellite imagery to look at estimates of, breach a level of pollution, and we're trying to build some models that might estimate kind of more broadly what the black carbon emissions might be and how that might be associated with, with the climate change and the changes in glaciers in Nepal.
MR. GOECKE: Okay. You said that your students normally do the air modeling. When was the last time that you performed an air modeling?
THE WITNESS: It's probably been 15 years.
MR. GOECKE: Okay. And when you were doing air modeling, what training did you have that enabled you to be able to do air modeling?
THE WITNESS: So I don't think I had any formal training. Once I -- after I graduated from the program, we created a course on air quality modeling that students took after me, and so I certainly knew the professors that kind of taught that. So it was just kind of ad hoc, catch it as we can, and working with people who know the models, who teach the models, and work with them. In general, it's not, not that hard. There's usually a pretty good guidance and criteria, and certainly, if you're using one of the EPA models, you could call them up and there's always somebody

there who can help you kind of with those, with that data.
MR. GOECKE: So you're saying air modeling is not that hard?
THE WITNESS: You know, running the models is not that hard.
MR. GOECKE: And what else does air modeling involve besides running the models?
THE WITNESS: Well, there's a lot to air modeling beyond that. So there's all sorts of assumptions about inputs that have to go into the models that you have to kind of assess, you have to collect those data, but actually, just kind of pushing the button and getting a number is something that the software does for you at that point --
MR. GOECKE: Yes.
THE WITNESS: -- but there's a lot of data that goes into creating those inputs, assessing kind of the ranges and things that might be associated with different models that you might be running.
MR. GOECKE: Yes. Did you perform or arrange to have performed any air modeling for this, for this matter?
THE WITNESS: I did not.
MR. GOECKE: In terms of the advisory panels that you've sat on for the National Academy of Sciences, have you ever sat on a panel that determined air quality standards?
THE WITNESS: Yes.

MR. GOECKE: And what are they?
THE WITNESS: That would be the ACGIH and that's -- they set standards for guidelines for air quality standards for the workplace.
MR. GOECKE: And what does ACJ stand for?
THE WITNESS: Well, it's like IBM now: they say it doesn't stand for anything, but historically, it stood for American Conference of Governmental Industrial Hygienists, and they, they publish things called threshold limit values --
MR. GOECKE: Yes.
THE WITNESS: -- which are the workplace guidelines that most industrial hygienists used today, and those were the subject of the lawsuit that I've talked about before.
MR. GOECKE: Okay. And those threshold limit values, what toxins or substances did you establish TLVs for?
THE WITNESS: Well, when I chaired the committee, when I chaired the ACGIH -- you know, every year they update them, and so there's dozens that are changed every year -- and I served on the board of directors for 15 years, and I was responsible for helping manage kind of the process that reviewed and established new levels probably for, you know, 30 or 40 agents over that period of time.

MR. GROSSMAN: What happened in the lawsuit, by the way?
THE WITNESS: So the -- how much detail do you want?
MR. GROSSMAN: What was the result?
THE WITNESS: So it was thrown out.
MR. GROSSMAN: Okay.
THE WITNESS: The lawsuit tried to establish that we were a de facto FACA, federal advisory committee, and we had to open all our meetings to the public and all our decision making to the public, and we argued that we weren't a, we weren't a federal government, even though OSHA adopts the ACGIH standards all the time, that we were not a government regulatory agency and that FACA did not apply, and we were successful in that argument.
MR. GROSSMAN: I see. Okay.
MR. GOECKE: Have you ever played any role in the EPA National Ambient Air Quality Standards setting?
THE WITNESS: Only in that they cite some of my research.
MR. GOECKE: Yes. And what research have they cited by you?
THE WITNESS: Oh, gosh, you know, I don't -- I haven't done that tally. You know, if you look at some of the criterias, documents that kind of come with these

standards and you search for my name, you'll see it there, but --
MR. GOECKE: Okay.
THE WITNESS: -- certainly some of the PM work that we've done on childhood asthma and certainly some of our NO2 work we've done on, on -- I know for a fact that, because I looked at it this year, that the draft of the NO2 review that EPA is doing cites a number of our studies directly --
MR. GOECKE: Yes.
THE WITNESS: -- more recently. So --
MR. GOECKE: So it's your understanding that the EPA has considered some of your studies as part of their process to set National Ambient Air Quality Standards.
THE WITNESS: Yes. In fact, our ozone study was done purposefully to influence the EPA's reconsidering the ozone standards. That was a study that was funded by the American Thoracic Society, and they were interested in kind of getting an evidence base to support lower ozone standards. And so that study we did quite quickly with the purpose to get it in the record in time to influence the EPA decision making for ozone.
MR. GOECKE: For their current decision-making process or --
THE WITNESS: Yeah.

MR. GOECKE: -- standards that have already been set?
THE WITNESS: Their current one.
MR. GOECKE: Okay. And this study was published in a peer-reviewed article, and which one is that?
THE WITNESS: I don't think that's in that, that list of stuff -- oh, on my CV?
MR. GOECKE: Yes.
THE WITNESS: The first author is Berman. I'm looking for it.
MR. GOECKE: Okay. Berman, Fann, Hollingsworth, Pinkerton?
THE WITNESS: What number is that?
MR. GOECKE: Number 10 on page 7 of your CV.
THE WITNESS: Sounds like it, yes. So that's actually -- so I don't know if you know, kind of, nowadays with electronic publication, before it comes out like in a print volume with a page number, they give it this kind of electronic kind of designation. So even though there's not a page number -- it has a page number and volume now, but at that, at the time I did this, it did not --
MR. GOECKE: Okay.
THE WITNESS: -- but it's still considered published at that point.
MR. GOECKE: Okay. Have you ever done air

modeling of a gas station before?
THE WITNESS: No.
MR. GOECKE: And, also, if you could point out for me the articles that you've authored or co-authored relating to the health effects of exposure to vehicle emissions.
THE WITNESS: I believe the question I answered was on traffic-related pollutants. So the Berman, the Berman one would certainly be one.
MR. GOECKE: Okay.
THE WITNESS: Then No. 11, Inkyu Han: Assessment of heterogeneity of metal composition of fine particulate matter collected from eight U.S. counties using principal component analysis.
MR. GOECKE: Okay.
THE WITNESS: The -- No. 15, Breysse et al., on the EPA particulate matter research centers. Then I participated in a number of studies looking at the biological impact, not in humans, but in cell and animal models. An example of that would be Publication No. 17, where, where I collected particulate matter from Baltimore City and they exposed it to endothelial cells. In this case, we're looking at kind of the mechanism through which particles might kind of lead to or increase cardiovascular risk. We know that they cause and increase cardiovascular risk; we're not quite sure why, and there's a lot of basic

biology that I collaborated on. So there's a number of studies related to that.
Then I think No. 21 is the same thing, in particular, the link between -- inhaling particles and cardiovascular disease is a curious link because it's obvious kind of how particles might affect the lungs but how do, how do particles affect the heart? And so there's a lot of basic biology research looking at that.
MR. GOECKE: And that was, again, focused on animal --
THE WITNESS: Yeah. Right, yeah.
MR. GOECKE: -- animal health, not human? Got you.
MS. CORDRY: I'm sorry. Did you say animal health? I thought you said you were looking at endothelial tissues and everything. Were those animal tissues or human tissues?
THE WITNESS: Those were, those were -- those two studies were in animals --
MS. CORDRY: Okay.
THE WITNESS: -- animals and animal tissues.
MS. CORDRY: Okay. Thank you.
THE WITNESS: If you look at No. 29, here's an example of a study where we're looking at, yeah, gene expression in human airways that might be related to kind of

why we see a high asthma risk to people who are exposed to air pollution. So, again, that's a mechanistic study but that's in, that's in humans.
Study No. 30 is we're looking at whether air cleaners improve kind of children's health or not, and certainly an air cleaner in a home is going to lower pollution from a variety of sources including that comes from outdoors, which is going to include ambient particulate matter. And then Study 32 is we're looking at indoor particulate matter and asthma morbidity in children, right, and the same argument applies there in that particles inside a home are going to be a mixture of those particles that come from outside, and most particles are generated inside.
MR. GOECKE: So these studies focus on health effects from vehicular emissions to the extent that there's vehicular emissions contaminating the air, but they weren't focused specifically on the health effects from vehicular emissions?
THE WITNESS: Right. They're focusing on pollutants that are associated with vehicle emissions.
MR. GOECKE: Yes.
THE WITNESS: So when you're in an inner city like Baltimore, for example, if you're measuring PM2.5 and you're looking at impacts of PM2.5 in Baltimore City, you're essentially looking at traffic-driven kind of pollution.

That's not true in every community but certainly in a community like Baltimore. The predominant source of PM2.5 in most of the neighborhoods that we're in are going to be traffic-related.

MR. GOECKE: Is that where these articles focused on, Baltimore?

THE WITNESS: Yeah. And so here's, if you look at -- No. 37 is an interesting article. This is very traffic-specific. And so there's a lot of interest in trying to understand, based on some research in Southern California, what the health impacts of living next to a lot of traffic is. So it's hard to tease out in a city like Baltimore because there's streets everywhere. Right? And so it's hard to say kind of what you're next to when there's this grid of streets with different vehicle traffic associated with them. But we found this neighborhood in Peru which was very interesting, because this is a large, we can call it, peri-urban area on the edges of Lima that has one road. And I've been there. It's literally one road. It's a big, like, five-lane road, and they have a lot of vehicle traffic on that road, and so it's a perfect place to kind of study what being close to the road means because there's no other traffic around there. Now, there's, there's -- it's a dry area; so there's a lot of the larger particles, but the main source of small particles is going

to be the traffic, and we've shown that because we've measured a pollutant called black carbon, and when you look at how the black carbon, which is coming out of tailpipes, is closer to the road than farther from the road, in this paper we showed that the asthma incidence is a lot higher closer to the road than farther to the road. And so this study got a lot of press, got a lot of interest because of the fact that it's a very unique setting to isolate this. Studies in LA can look at kind of what it's like being next to a major freeway, but teasing out, if you're next to a major freeway, what other roads you might be exposed to are a little bit more challenging.

So there's a large body of literature looking at traffic-related pollutant and being close to the road or far from the road health effects. It's pretty compelling that there's concern about being close to the roads, but it's hard to tease out exactly what kind of an exposure response might be because of this complexity, but this is a situation that we're very excited about following up on. So that would be one example of a study that focuses exactly and specifically on roadway exposures associated with mobile source, as we'd call it.

So, and in No. 38 --

MS. CORDRY: It's all right. It's all right. I think --

THE WITNESS: Okay.

MR. GOECKE: Mr. Grossman, I have no further questions and no objection to his submission as an expert witness in those areas.

MR. GROSSMAN: All right. Anybody else have questions, other parties?

(No audible response.)

MR. GROSSMAN: Okay. I accept Dr. Breysse as an expert in -- and you can stop me if I get this wrong -- industrial hygiene, epidemiology regarding health issues from vehicular emissions, as well as establishment and measurement of air quality standards and the evaluation of scientific studies and methodologies.

MS. CORDRY: Okay.

MR. GROSSMAN: Is that sufficient?

MS. CORDRY: Right. I think the epidemiology was not necessarily clearly, you'll see from his résumé, just specifically with respect to vehicular pollution. That was specifically of the more general area of epidemiology, and so --

MR. GROSSMAN: All right.

THE WITNESS: Mr. Hearing Examiner --

MR. GROSSMAN: Yes.

THE WITNESS: -- can I add something to that? I would put exposure science in there as kind of a rubric. So

I really consider myself an exposure scientist who works on health effect studies.

MR. GROSSMAN: All right. Well, all right, you weren't offered as an expert in that, but I suspect that --

MS. CORDRY: I'm happy to offer him as that --

THE WITNESS: I'm sorry. I didn't know if --

MS. CORDRY: -- if that's the best way he likes to characterize it.

MR. GROSSMAN: So --

MS. CORDRY: He's the expert in what he's an expert in. I will say that.

MR. GROSSMAN: Exposure science, and now I have to give Mr. Goecke an opportunity to further question you in that --

THE WITNESS: That's the new buzz word.

MR. GROSSMAN: It's like sustainability is the new buzz word in --

THE WITNESS: Yeah.

MR. GROSSMAN: -- well, it's not so new anymore, in land use things. But in any event --

MR. GOECKE: Can you define exposure science for us?

THE WITNESS: So, you know, exposure assessment is a process, and there's lots of scientific steps in that process. So it's the sciences underpinning the whole

process of what we call exposure assessment. So exposure assessment is, as I mentioned before, is, in the health effect studies, the part of the process at which you decide what and -- to what people are exposed to, how much, for what frequency, for what magnitude and what duration are you exposed to. And it applies to air pollution, water pollution. It applies to indoor environments, outdoor environments. It applies to workplaces and non-workplaces.

MR. GOECKE: That's fine.

MR. GROSSMAN: Anybody else have any further questions regarding exposure science?

MR. SILVERMAN: No, sir.

MS. ADELMAN: No, sir.

MR. GROSSMAN: All right. So the modified expertise of Dr. Breysse is industrial hygiene, epidemiology and health issues from vehicular emissions, and establishment and measurement of air quality standards and evaluation of scientific studies and methodology, and exposure science. And you are accepted as an expert as such.

THE WITNESS: Thank you.

BY MS. CORDRY:

Q Okay. In terms of your, now the substantive part of your testimony here, I'd like to start with some general questions about how studies are designed and conducted with

respect to the effect of pollutants on human health. When you are conducting a study relating to human exposures, the substances that can potentially affect human health, are there particular approaches that a scientist would take to those?

A So there actually are a range of ways to kind of approach that problem. Obviously you can do toxicological studies, where you can take animals or parts of animals and you could expose them to different pollutants and look and see how the animals relate. And those are attractive studies because you can usually expose animals to things at a higher concentration; you can expose larger numbers of them in a very controlled manner; you can sacrifice them when you're done; you have access to tissues that you couldn't have access to otherwise.

Of course, there's lots of limitations in those studies as well. The limitations are animals aren't humans, you often have to kind of expose them to high concentrations for shorter periods of time to mimic longer -- lower concentrations over longer periods of time. So there's concern about what the exposure-response relationship is at. But, in general, if you're looking for biological plausibility and a reason to believe that something might cause something else, these animal studies are crucial in that, and there's probably not a single kind of given health

effect, we believe, that hasn't been documented in some sort of animal model or more than one species, actually. And that gives us kind of credence to the biological plausibility that X might cause Y.

There's often studies that people do, clinical-type studies or controlled exposures in humans. These are not as common anymore, and there's a lot of human subjects problems with that. You may remember at Johns Hopkins a few years ago there was a problem because there was a participant who almost -- who died, actually, in a controlled trial where they were giving somebody an exposure to something. These type of studies are common for drugs more than environmental pollutants, but there are studies where you can put people in chambers and have them breathe ozone and you can measure, you can very much -- you can control the exposure; you can measure the change in physiology of people. We ran an ozone exposure chamber for years at Johns Hopkins.

The EPA right now is coming under fire because the EPA is exposing people to diesel exhaust -- you may have heard this in the news -- and of course, diesel exhaust is a carcinogen. This -- herein lies kind of the ethical dilemma: How can you, how can you expose people on purpose to a carcinogen? Even though they argue that, you know, people breathe diesel exhaust every day and we're not

exposing people to any exposure levels that are any different than you might get walking down the street, it still kind of creates an ethical problem about exposing people to something like diesel exhaust.

So in our studies we take pollutants and we put them in, we instill them in people's noses, for example, and we measure how much inflammation is produced in the nose. That's an example of a human kind of study in a clinical setting.

Then, of course, then observational epidemiology is another major area that kind of -- relied heavily upon and that's, that's where you look at populations of people and you make judgments about the disease patterns in people, then try to associate with patterns of exposure. And we call that observational epidemiology because oftentimes we just live with the world as it is.

Now, sometimes we do controlled studies in epidemiology. And we've done a couple of those, for example, where you can modify somebody's exposure on purpose and then you look and see kind of in a clinical trial-like setting, like you would for a drug, and then you look and see is there a change, but you're changing, you're purposely kind of changing the world to do that versus just observing the world as it is. But these epidemiology studies are very valuable, but on the downside they're expensive to do,

there's lots of biases associated with them, any one study by itself is usually not compelling, you have to look at a broad breadth of studies to kind of look at the whole picture of things to kind of come to some conclusions, and so as a result, the science in terms of epidemiology perhaps moves a lot more slowly than the animal science would because all these problems associated with you need large numbers of people often, depending on the outcome you're looking at; you need a lot of money to do a study.

So, for example, one of our asthma studies in kids in East Baltimore which would have 100 asthmatic kids, for example, would cost a billion dollars and take us five years to do. Right? So it's a long time and it's a lot of money, and it takes a big investment on the part of the government to fund that. And so usually the science underpinning the study you're trying to do must be pretty compelling to generate, to track those kind of resources, but as a consequence, you know, the data moves a little bit more slowly.

Q Okay. And if you're doing these kind of epidemiology studies in the real world, does that give you a better or less ability to look at things where you have a mixture of pollutants as opposed to how you would look at a mixture if you have these, sorting out the effects, if you have these other kinds of studies?

A Well, sure. In animal studies, you know, mixtures are very straightforward: you look at Pollutant X, you look at Pollutant Y, then you're exposing the animal to Pollutant X and Y. So you're in a very controlled manner. You can look at kind of what's X, what's Y, what's X plus Y. But in the real world we're rarely ever exposed to a single thing, and so teasing out multi-pollutant exposures is actually kind of a challenge.

And so the science is trying to move, I think, more aggressively towards looking at things in a more holistic kind of way, but right now what our approach would be is we look at Agent X and we look at Agent Y and we see if there's an effect from Agent X if we control for Agent Y. So independent Agent Y being there, there's Agent X. So, for example, in our studies we look at NO2 in people's homes and we measure the particulate matter in their home. We look and see does NO2 cause a disease risk if we control for NO2. So regardless of what PM people have, do we see an NO2 risk, and if we do, then we say that's an NO2 signal.

Now, the -- then we do the same thing with particulate matter. So that's scientifically just fine. We can do that. That helps the EPA because the EPA has to look at kind of one pollutant, buy us time. But the real question is, well, why -- what's worse for these kids when they're exposed to both at the same time? We don't have

good methods for that right now, and in fact, the EPA's progressively funding a lot of research now to look at multiple pollutants because they want, they want to begin to regulate pollutants now as a mixture. So traffic-related pollutants are a perfect example because there's -- you're not just exposed to NO2, you're just not exposed to carbon monoxide, you're just not exposed to particular matter. We can try and design studies that reduces those to their individual components and provide EPA evidence to help them regulate them as individual chemicals or agents, but the reality is the sum of the exposures likely would be different than what you'd get by just looking at each one by itself and it's likely going to be higher; it's likely going to be worse, kind of the mixture.

And so we're actually trying to move more holistically to kind of these, looking at kind of these mixtures of exposures. We're not quite there yet. That's the next horizon to the EPA regulations. They want to begin to regulate mixtures of pollutants rather than single pollutants, but the scientific base has to catch up with that for them to do that, which is why they're funding more research to kind of come up with these joint pollution kind of metrics for their studies, but we're not there yet.

MR. GROSSMAN: When you say that the combination of the effects is likely to be worse, you're saying there's

kind of a reverse synergy; that is that if you would take each of the individual effects alone and sum them up, it wouldn't be as bad as having the combination --

THE WITNESS: Yes.

MR. GROSSMAN: -- of all of them together?

THE WITNESS: Yeah.

BY MS. CORDRY:

Q Can you give us an example of --

A So a classic example we teach is asbestos and cigarettes. So if you smoke cigarettes, you have a risk of getting lung cancer. We'll just call it X. Right? And if you are exposed to asbestos, you have a risk of lung cancer. We'll call that Y. If you do -- if you're exposed to both, your lung cancer risk is a lot more than X plus Y. Right? So there's a synergism between the two, and there's reason to suspect, for example, that there's a synergism between these pollutants, especially to have something like the respiratory tract.

One example we're trying to explore, for example, is that this whole cardiovascular disease risk, why does that, why does that occur, and we know, for example, in some of these animal studies, if you take cells that line your respiratory tract and you put particles on them, they form a pretty good barrier so the particles don't get through that barrier. They do stuff to those cells, but they don't get

through. But now, if you put other chemicals on top of that, that barrier function breaks down, and what that means is, we think, is now the particles are becoming more available to your systemic system to have an effect on the cardiovascular system.

So that's a way we're trying to look at kind of how do these combined effects occur and what might it mean to be exposed to both together in terms of the synergistic risk.

MR. GROSSMAN: Okay.

BY MS. CORDRY:

Q Okay. And we'll come back to that some more as we're going along here. When you're looking at studies and you're trying to evaluate the value of the study, how, what it's really telling you, are there some measures that are used by scientists to evaluate how strong the study's results are?

A Oh, you know, absolutely, and I don't mean strong as just being positive, you know, because we -- there's a publication bias problem in science that, that people, if you get a negative study, the feeling is, oh, my gosh, I don't want to publish it, but you know, a good, a well-done negative study could be every bit as valuable as a well-done, kind of positive study. So good and bad doesn't mean, in my lexicon, whether it sees something or not.

MR. GROSSMAN: When you say a negative study, you mean one where the results do not meet the hypothesis or you mean --

THE WITNESS: Right, yes.

MR. GROSSMAN: -- having a bad effect on people?

THE WITNESS: No. So a negative study means you didn't, you didn't see the health effect you thought you'd see.

MR. GROSSMAN: Okay.

THE WITNESS: Right. And so, you know, those -- and unfortunately, a lot of times, you know, journals want the studies that show a health effect; they're not as excited about studies that don't show a health effect, but I always encourage my students and stuff to not -- you know, they go home dejected, they're working on a thesis and they say my study is negative, I didn't show that it caused, made people die, I'm not going to publish it. We say, no, we're going to publish it anyway, we're going to show it that way.

So hallmarks of a good study, you know, are -- it depends on the type of study, but certainly you want to have enough sample size. So you want to have enough observations to see an effect, and you need to make that determination, inquiry area up front. So you say that I think if X is going to cause a twofold increase in Y and I know this is how much X varies and this is how much Y varies, how many

people do I need to see a twofold increase if it really exists. Right? And so the sample size has to be kind of clear and that has to be presented early in the papers because, if you see a negative effect but the reality is you don't have enough sample size, enough observations to determine the effect size you want to see, then I'm going to not be very excited about that paper. Right? I may actually kind of reject that paper if I was reviewing it, because I'd say, jeez, they set up to do a negative study because they didn't have enough observations to even determine kind of the effect sizes they're looking for.

And so we look for how are people recruited to studies; the way you recruit people to studies can create a bias. And we look at -- so the recruitment is important. So, you know, for example, a study that says I want to get 100 kids with asthma and we went to the medical records and the first 100 we got agreed to participate in the study, that would look pretty good. Another study said I got 100 kids with asthma but I had to ask 2,000 kids with asthma to get the 100 to participate, the first question I'd ask is, well, jeez, what's different about the 100 kids that agreed to participate versus the vast majority of kids that didn't participate? Is there some reason why they might want to have agreed to participate versus ones who didn't agree to participate that might bias kind of the results? So we look

at kind of this recruitment bias.

There are other sources of bias. There's measurement bias. We look at how do they assess exposure, how did the assessment exposure relate to the time frame and health outcome you're looking at. So there's a host of things we can evaluate in terms of kind of the, the quality of the study. And like I say, if all those things are there and it's a negative study, it doesn't show the health effect you want to effect, that's still a good study.

BY MS. CORDRY:

Q Is there a particular terminology for determining -- that kind of sums up this evaluation process in terms of your confidence?

A I don't know what you mean.

Q Well, okay, I'll use a term that -- we've seen the term confidence interval and statistical significance.

A Okay. Yes.

Q How do those relate to what you were just saying right now?

A Okay. So that's not necessarily related to the quality of the study --

Q Okay. I'm sorry.

A -- although it can be. Right?

Q Right.

A So, but if we're looking at whether a risk is

significant or not, right, there's a statistical probability that, you know, an excess risk could be by chance, and we need to quantify that and we need to present that in the paper, and we can do that a couple of ways. We can look at P values. So if we say there's a five percent increase in asthma morbidity and that five percent, you know, it has a probability of being high, it's less than five percent or not, then we can kind of say that it's probably not due to chance.

So we know that just about anything we measure, right, there's a chance you're going to get a funny measure just because of outlie. Right? And so you want to quantify that probability. We do that two ways. One is we put a confidence interval about it and, if that confidence interval is, you know, excludes number one, we can say that it's a statistically significant increased risk. We can put a probability on that value. We say the probability is greater than .05. We have a 95 percent chance of thinking this is really real, which means there's only a five percent chance that that's due to chance. Right? So it still could be true.

So one study by itself -- this speaks to back why one study doesn't matter. You can still have a study where, where you have a five percent, only a five percent chance of it being positive, but it could still be kind of a spurious

finding. And so when you have five studies, though, that all kind of show statistically significant, then you become more confident than that.

And there's no magical number, by the way, of this five percent. I don't know where this five percent came from. Our statisticians tell me it goes back to a bunch of statisticians sitting in a room. So there's nothing magical about something that's got a six percent, although in the paper, the editor of the paper would probably say you can't call it significant if it's got a P value of .06 versus a P value of .05, but there's nothing magical about that. Obviously, if something is less likely, the probability of referring to chance is greater. If it's more significant, that P value gets smaller, and the smaller it gets, the more -- less likely it's due to chance; the greater it gets, the more likely that it's due to chance. And there's a judgment that we make, and just for some odd reason, somebody picked that .05 years ago. But personally, I don't hold to that, and if I see a risk that's at .06, I say it looks like there's an elevated risk, it doesn't quite meet statistical significance but it's still kind of something I think we need to kind of think about, and I don't put any more value on something that gets a .04 versus .06.

Q Okay. But that's a general range. That's an accepted thing. If you -- is one of the reasons why you

might not have significance, I think you mentioned, was the number of study points in a particular study, that it might be too small. Is there a way to deal with that in terms of additional studies, or you know, is there a way that the evaluators look at that?

A Well, sure. I mean, additional studies/larger sample sizes will always kind of help to answer that question, and in fact, oftentimes a study will be borderline significant and the recommendation in the back of the paper will be a larger study needs to be conducted to see if this is a chance finding or not.

Q Okay. In general, you said you did a lot of peer review of articles and proposals. What would be your view of a study or an analysis that didn't discuss these sorts of margins of error and provide these kind of calculations?

A So it, you know, it likely wouldn't be publishable or acceptable if somebody wrote a grant that didn't kind of estimate the variability in some way that allows you to kind of quantify the likelihood that a number represents what they think it represents or not. There has to be some sort of estimate of variability.

Q Okay. And if someone was trying to do modeling for a future development, how do these concepts that you've just been talking about fit in, in your opinion?

A So in modeling the same sort of concepts apply.

Right? And so a model can give you a single number, or the model can give you a range of numbers, depending on how you set it up. And I know for risk assessment purposes in the U.S., the EPA, the current guidelines has suggested, you know, single estimates are probably not as helpful because they're, they're limited to just what those exact inputs are. And the reality, as we've seen in this case and other cases I've been involved with, you can run a model and get a range of numbers, depending on who's picking what the input values are.

And so the standard of practice that I would look for is that you -- for every input value, there's a range of things that it could be and that there are statistical techniques you can use to sample from those range of values, and you run the model multiple times, looking at all the different inputs and what they could be, and then you come up at the end of the day, a distribution that comes out of the model that says the real answer is somewhere in here. All right. We don't know exactly what it is, right, and to say that you run the model once, you get a single number and say that's the real number is probably not a fair way to kind of think about it. So the real number is really somewhere within this distribution of values, and then you can put some -- then you can say, you know, the middle of that is here and I'm confident this is a real number with

some sort of statistical significance or not.
So there are ways to use the same approach to running models and coming up with model outputs that have uncertainty associated with them and that's the current standard of practice that -- the National Academy of Sciences created a committee to review risk assessment for the EPA and other regulatory agencies a few years ago, and they came out very strong that this uncertainty estimation has to be a key component of any risk assessment. Of course, modeling is a key component to the risk assessment because the model provides the inputs to generate the exposures that you use to kind of assess whether somebody's at risk or not.
MR. GOECKE: Mr. Grossman, I would object to Dr. Breysse's testimony about the methodology in modeling. He doesn't have any formal training in modeling. He's testified he hasn't done one in 15 years. He testified he's not involved in determining what the inputs are. He simply takes someone else's inputs and runs the numbers, which he describes as not complicated, but I think now he's going into where do these numbers come from and how do we derive these numbers and that's outside the scope of his expertise.
MR. GROSSMAN: I don't think it is outside the scope of his expertise as it's been accepted here, given his expertise in establishment and measurement of air quality

standards, evaluation of scientific studies and methodologies. So that latter, it seems to me, covers this field. I think your objection, or I'll take it as an observation, it goes to the weight to be assigned to his testimony on this particular point, but it's certainly not outside of his general area of expertise. So I'll overrule the objection.
MR. GOECKE: Thank you.
BY MS. CORDRY:
Q And in terms of what you've just said about running a range of models, what if the person doing the model says, well, I'm just going to pick very conservative assumptions and they'll be so conservative, that ensures there isn't a problem with making sure my value is within the range -- what's your reaction to that?
A So historically that was the approach that was often taken, and early on the conclusion was made that conservative is in the eye of the beholder. And the problem with that is that everybody could come up with different conservative assumptions and now you have this competing kind of I think it's 12; no, it's 10. The reality is it's, there's a distribution of answers that probably encompasses both 12 and 10, and the reality is, is 12 isn't any more right or wrong than 10. And so the better approach, like I say, is to really, is to come up with this, this more

sophisticated approach. And while I don't run models right now, I have lots of students who run the models and I critique the output from their models and I look at all their assumptions that go into their models and I review papers that have the models and stuff in them, and I can tell you, this is, this is truly the standard approach and we would not accept that as a, as an outcome from a student who was working on a thesis, to take -- estimate the worst case and run a model with one set of input parameters that's representative of so-called worst case. And the reality is, is exactly what I said: worst case is in the eye of the beholder and that might be the right answer but the reality is, there's some uncertainty around that answer. If you don't know how uncertain that answer is, you really can't put any confidence on just how right it might be and that's why you need to make these distributional assumptions about input parameters. You run the model, you come up with a range of values, and the real answer is you have some -- you could calculate what the average of those are and you can say I think the real answer is this but it could be, I'm 95 percent confident that this is within this kind of range. You come up with kind of that estimate and that's the standard of practice today, in my opinion.
Q Okay. If you have a range of assumptions and each one has some uncertainty levels, is there an easy way to

combine all those different uncertainties and to come up with a global uncertainty, or is it -- are they additive? Do they multiply?
A Well, it's often, it's often more complicated than that, which is why you can't just say off the top of your head that, you know, they're going to add or multiply or what, so which is why you usually just kind of let the model run and you create, like I say, a -- if you think there's a range of idling times that are going to produce, impact the model, you say, well, here's the distribution of idling times that we think could exist, here's some -- it could be really low, it could be really high, here's what's probably in the middle, and you create that distribution. Then you tell the computer, you say, randomly sample from that distribution 1,000 times and come up with 1,000 different outputs based on that, and that output will kind of accompany kind of the variability associated with just how high or how low idling time could be. And then you add everything else together, you come up with these distributional assumptions for every input, and the model will run, and you tell it to run -- computer times -- you can tell it to run 1,000, 10,000 times, and it runs. It might take a couple of days to run, but at the end of the day, you get an answer, an output that has this kind of distributional weighting associated with all these different

inputs and what they might be that tells you with some confidence what the real answer might be.

Q So if you're reviewing a study using a conservative-assumption approach and you found that there were, you thought there were mistakes in either the assumptions that were being used, the analysis that was being applied to them, what would you tell the person to have to do?

A Well, you know, you always kind of challenge your assumptions, and if your assumptions don't stand up to scrutiny, you, you have to kind of start over and reevaluate kind of what those assumptions mean. But like I say, just this -- you want to get out of that trap, and this is why, you know, the EPA guides, you know, kind of say that doing this kind of worst-case, kind of single-estimate kind of number creates this kind of problem, because then you do have dueling experts who will say, you know, I think it's this and I think it's that. And they're both right, but the real answer -- you know, then how do you decide which one is more right? That's where the, kind of their outcome is from.

Q And would you think then on that basis it's acceptable to come back and say, well, I'll just turn down a couple of my assumptions, I'll just change a couple of my assumptions at some point, just one at a time, to another

set of single numbers?

MR. GOECKE: Objection.

MR. GROSSMAN: And the basis for your objection?

MR. GOECKE: It's abstract. It's what's the context, what are the assumptions, what are we modeling. It's too general.

MR. GROSSMAN: He's being asked general questions of a -- Ms. Cordry hasn't specifically named the particular study here, but I think it's, the context is somewhat obvious, but I think she's entitled to ask this sort of general hypothetical question of an expert. So I will overrule the objection.

MR. GOECKE: Thank you.

THE WITNESS: So I think the trap you get into is that a model is a representation of reality, and the question becomes how good a representation of that reality that is. And reality is not something that moves, right, with assumptions. The assumptions can move, but the reality should be kind of something you kind of fix. And when you come up with single-number estimates, you're always going to be -- you're going to always be in this trap where, you know, I can get you -- and I'll be honest with you, a good modeler can get you any number you want if you come up with kind of a single number, right, which, and which is why I think you kind of want to avoid that trap of kind of

changing your assumptions, assessing whether this is really conservative or sort of conservative or modestly conservative or this is more realistic now. It gets you out of that trap of saying, here's a single number and I think this number is the right answer.

MR. GROSSMAN: I'm not sure I understood your answer to her question. So Ms. Cordry asked you, well, when you have this issue, can you just change a couple of assumptions, and I'm not sure I understood what your answer was.

THE WITNESS: I don't think you can. I don't think you should and for the reason I just said: you get into this trap now that you're, you're still creating these single-number estimates and that, that new number you produced isn't any, you can't justify it as being any closer to the truth than the previous number. Right?

MR. GROSSMAN: Okay.

BY MS. CORDRY:

Q Turning a little more specifically now to studies dealing with human health effects from exposures to various substances, can you describe in general, when you're doing a study -- and I think you started to talk some of this -- about what's sort of the process of what you're trying to do in terms of determining if there is a health effect from exposure to a particular chemical?

A Okay. So when you do a study, first of all, you start off with a hypothesis that says I'm going to, I'm going to, I expect to see this causes this, and you design the, you design the recruitment and experiment and the sample size to kind of accept or reject that hypothesis. Right? And so you'd never get a grant funded today without having a very clearly articulated hypothesis.

So depending on what the hypothesis is, you go and you recruit participants, with or without the exposure of interest, depending on the study design, and you follow them. A typical study might be you follow them over time. You look and see, as their exposure changes, does their disease status change and, if you know how their exposure is changing and their disease status changes -- so an example of that would be, we study kids with asthma, right, and asthma is a disease. If anybody in this room has asthma, you know, your symptoms can come and go: one day you could be bad; the next day you could be better. They come and go, and the question is, does the daily changes in air pollution affect your daily changes in asthma symptoms?

So that's the way you, that's the way you articulate the question. That's says, now we want to do a study that measures kids' asthma health every day and measures their pollution every health every -- the pollution every day. And then if you do that, at the end of the

study, you look and see does the change in pollution, is it statistically associated with the change in asthma morbidity, and if it is, you say I think this is, this is causing the increase in asthma morbidity. And that's exactly the kind of studies that we do in our children's center and that we've done in our COPD studies.

Q Okay. And when you're looking at that, are you looking at a single level of pollution or are you looking at a level of pollution that can vary over time?

A So these are observational studies. Right? So we let the pollution vary, right, as it does in the real world, and if the pollution doesn't vary very much, you're going to need larger number of samples, larger number of people -- if it varies more, maybe you can get away with a smaller number of samples -- or maybe you have to follow people for a longer period of time. Right?

So there's lots of things that kind of go into this kind of assessment of, kind of, how often do you measure somebody and how long do you measure them for to kind of get you, kind of, the answer you want. But we normally would measure kids over a whole year, and we'll assess their asthma morbidity at, you know, for a week to two weeks during the summer, winter, spring, and fall, and we measure the pollution during those times, and we find that's a very powerful design to assessing kind of the

relationship between pollution and asthma morbidity, in particular.

MR. GROSSMAN: Ms. Cordry, is there any reason why we're approaching this so elliptically, in a more general area, rather than getting down to the nitty-gritty of any studies that were made here and issues that are directly before me, rather than having me kind of conjure up a connection?

MS. CORDRY: We're getting there very quickly. I'm trying to --

MR. GROSSMAN: Okay.

MS. CORDRY: -- set the thing and provide the general background, and we are coming -- I'm focusing in.

MR. GROSSMAN: All right. I wish -- yes.

MS. CORDRY: Okay.

MR. GROSSMAN: I'm asking you to do that --

MS. CORDRY: All right. Yes.

MR. GROSSMAN: -- focus in.

BY MS. CORDRY:

Q All right. And so at the risk of leading you, these kinds of relationships, are they called dose-response curves?

A Well, we call them exposure-response curves.

Q Okay. And in terms of that, is there -- one of the things we have talked about here is that the EPA rules

for both NO2 and PM2.5 say in the rules that there's, quote, no evidence of a threshold for those chemicals. I can give you the cites if you'd like, but we've talked about that before. Those are statements in the rules.

MR. GROSSMAN: Well, you talked about it. I don't want you to -- you are leading the witness now.

MS. CORDRY: Well, that, I'm just saying, I can show you the pages -- my question is, what does that mean when you say there was no evidence of a threshold? That's what my question was going to be and that is my question.

BY MS. CORDRY:

Q When the EPA is talking about and when you have scientists discussing the fact that there's, quote, no evidence of a threshold, what is the meaning of that within the scientific analysis?

MR. GROSSMAN: By the way, I'm not sure the EPA said it. I think it was in the --

MS. CORDRY: Okay. I can --

MR. GROSSMAN: -- I think it was in studies that were presented --

MS. CORDRY: No.

MR. GROSSMAN: -- to the EPA, but I can't recall if it was --

MS. CORDRY: Okay.

MR. GROSSMAN: -- the EPA that said it. So --

MS. CORDRY: Yes. I will show you on page, for instance, in Exhibit 424(b) at page 6480 -- I mean, the EPA has to draw from the study. So obviously --

MR. GROSSMAN: No, but the question, I think you posed it as --

MS. CORDRY: Right.

MR. GROSSMAN: -- the EPA saying. The question --

MS. CORDRY: Right, and they --

MR. GROSSMAN: -- that I'm asking you is that, is this something that was said --

MS. CORDRY: Yes. Okay.

MR. GROSSMAN: -- and I know it came from --

MS. CORDRY: Yes.

MR. GROSSMAN: -- your Federal Register entry, but was this something that was said by the EPA or to the EPA?

MS. CORDRY: Well, the EPA, in looking at the studies, draws a conclusion.

MR. GROSSMAN: That's not my question. My question is, is this something the EPA said or is this something --

MS. CORDRY: Yes.

MR. GROSSMAN: -- that was said to the EPA?

MS. CORDRY: It is something the EPA said. Let me --

MR. GROSSMAN: All right. So --

MS. CORDRY: -- find the quotes for you. For instance, at page 6500 on the Federal Register, which is Exhibit 424(b), dealing with the NO2: In considering this analysis, the administrator notes the following. It's talking about a meta-analysis about NO2 exposures. It says: The NO2 -- I'm sorry. This meta-analysis does not provide any evidence of a threshold below which effects do not occur, and this is what they're relying on in terms of making their standards.

MR. GROSSMAN: So you're saying the administrator of the EPA made a comment regarding meta-analysis, is what you're saying. I mean, it's not a --

MS. CORDRY: Okay. Well, I'm -- okay. Okay.

MR. GROSSMAN: -- I just want to make sure your question --

MS. CORDRY: Okay.

MR. GROSSMAN: -- poses a proposition that is --

MS. CORDRY: Okay.

MR. GROSSMAN: -- accurate. That's all.

BY MS. CORDRY:

Q Okay. The question is that the EPA, looking at the evidence to date, says, when we look at this evidence, it shows us no evidence of a threshold.

MR. GROSSMAN: Well, it's not the EPA. It was the administrator of the EPA.

MR. SILVERMAN: That's the same thing.

MS. CORDRY: Well, that is, that is -- okay.

MR. GROSSMAN: I'm not sure that that's the EPA.

MR. SILVERMAN: Yes, it is.

MS. CORDRY: Well, yes, the administrator of the EPA is the person who is making these judgments and putting out, making a determination on these standards.

MR. GROSSMAN: I'm not sure that's exactly the same. I think the EPA --

MS. CORDRY: Okay. Well, then --

MR. GROSSMAN: -- puts out something but administrators can say things; that's not necessarily the statement of the Environmental Protection Administration.

MS. CORDRY: Okay.

MR. GROSSMAN: There are differences.

MS. CORDRY: Okay. I understand.

MR. GROSSMAN: I just want to make sure you're postulating --

MS. CORDRY: Okay.

MR. GROSSMAN: -- something to him, and is it necessary to postulate that to him in that way?

MS. CORDRY: Well --

MR. GROSSMAN: Why don't you just ask a question without the preface.

MS. CORDRY: Because you're asking me to focus

very specifically on this --

MR. GROSSMAN: Right.

MS. CORDRY: -- and what I'm saying, very specifically, with respect to these particular chemicals in here, the administrator of the EPA, who is the head of the EPA, who is the person who was making these judgments under these rules, which are the judgments of the EPA when they issue --

MR. GROSSMAN: If they issue.

MS. CORDRY: These are the issued rules.

MR. GROSSMAN: The statement that you quoted is not the rule that was issued. It is a statement that was made by the administrator.

MS. CORDRY: Okay.

MR. GROSSMAN: I just want to make sure we're accurate in what you're postulating --

MS. CORDRY: Okay.

MR. GROSSMAN: -- to the witness, okay?

MS. CORDRY: What I'm saying, though, is that in making the determination as to what rules --

MR. GROSSMAN: We don't have to have this discussion.

MS. CORDRY: Okay. Okay. Right.

MR. GROSSMAN: Let's rephrase the question in a way that doesn't require that particular assumption.

MS. CORDRY: Okay.

BY MS. CORDRY:

Q In the EPA discussions leading up to the rules that they issued with respect to both the NO2 and the PM2.5, there are statements that there's -- that the studies indicate no evidence of a threshold with respect to either NO2 or PM2.5. What, as a scientist, does that statement that there is, quote, no evidence of a threshold, what does that mean with respect to studies?

A So one thing it doesn't mean is it doesn't mean there's no threshold. It's just perhaps because we haven't found it yet.

MS. ADELMAN: Yes.

THE WITNESS: So we know that the science -- you know, as air pollution levels started out very high, we could look at health effects at those levels. Our ability to look at lower concentrations wasn't possible because everything was high. As exposures come down, the science looks at, is there health effects now that they're lower, and if we see something, they say yes and the EPA lowers it again; if they see something, they say it again, yes. And so what that means is this march of safe levels over time are, and ambient air qualities over time, going down, where there's no sense that we've reached kind of a point where we think there's -- at least in a way that we can't document

any kind of risk.
So there's likely going to be risk at current EPA standards, and we haven't shown that yet because the science hasn't caught up yet, because the exposures now come down. And if you look at the -- the EPA is a huge success story -- if you look at ambient air quality across the U.S., you know, nationally the trend is coming down, down, down over time, and as they come down, the science catches up with what the new current levels are.
So we're studying, you know, PM concentrations today that are on the order of, you know, you know, five, 10, eight, 15, 20, 25 micrograms per cubic meter, and we couldn't study those exposures 30 years ago because they didn't exist, right, because they were all much higher than that.
So the science moves, and to date, it does not appear that we found kind of what that threshold level is. At some point, we're going to have to find it. I personally don't believe that there's, that there's no threshold, but it's just, we don't have evidence of what that is yet. So there's still, there's still risks as we go down on that exposure curve.
BY MS. CORDRY:
Q Okay. All right. So that no evidence of a threshold, at this point, means that as far down as they've

gone on the exposure curves --
A We're still seeing risks.
Q -- based on what they see, they're still seeing that? And we'll come back to the details of that in a little bit. If one cannot establish that a pollutant has a safe threshold, does that have policy implications of how to deal with that pollutant?
MR. GOECKE: Objection. Leading.
MR. SILVERMAN: No, it isn't.
MR. GROSSMAN: No, I think that -- I'll overrule that.
THE WITNESS: So I guess the policy implications, well, I -- there's policy and public health implications. So the policy implications are the EPA has to constantly kind of think about what it means to have lower exposures. So somebody's got to fund the next generation of research that says, look, we think that 12 is safe but we think there's maybe evidence that it's lower than 12; maybe we ought to do some science to see if we need to lower it even further, which is part of this march of kind of the science I talked about before.
But there's also public health policy perspectives, and you know, at some point, you decide yourself, well, if we don't think there's a threshold, if there's some exposure that I can avoid or should be avoided,

you know, as a public health practice, I'd say let's try and avoid it. There's no, you know, if we don't have to have a new source, as in this case, that's going to produce pollutions that are maybe at or below where we think the threshold currently might or might not be, if we can easily avoid those, maybe it's good, prudent public health policy to do so.
BY MS. CORDRY:
Q Okay. So if you have a facility such as a gas station that will put out at least some levels of pollutant, no matter how small it is, does that mean we can never build such a facility? Is that just an inherent effect of any gas station that --
MR. GROSSMAN: Well, let's ask one question at a time.
MS. CORDRY: Okay.
MR. GROSSMAN: What's the question? One question. If you have a facility such as a gas station, what's your question?
BY MS. CORDRY:
Q That might put out some levels of pollutant, is inherent in that gas station to -- I'm sorry. That's really not a good way to do it. Is there an inherent effect of pollutants from the gas station that must be accepted?
MR. GROSSMAN: Well --

MS. CORDRY: Okay. I'm sorry.
MR. GROSSMAN: -- I'm going to stop that question --
MS. CORDRY: All right. Let me start over.
MR. GROSSMAN: -- because that's a legal question.
MS. CORDRY: Okay. Okay.
BY MS. CORDRY:
Q All right. Assuming there is some level of pollutants that are going to come out of any gas station, no matter what size it is, does that say to you that this gas station has that -- that it's reasonable to build this gas station with the kind of pollutants that you are going to be seeing from it?
MR. GROSSMAN: Well, wait a minute. I'm not sure I even quite understand that. You started out with the assumption that any gas station is going to have some level of pollutants. Then you said this gas station.
MS. CORDRY: All right.
MR. GROSSMAN: Are we talking about the --
MS. CORDRY: Yes. Right.
MR. GROSSMAN: -- the one proposed by Costco?
MS. CORDRY: Right.
MR. GROSSMAN: And so what's the question about this particular gas station? I didn't --
MS. CORDRY: All right.

MR. GROSSMAN: -- quite follow that.
BY MS. CORDRY:
Q I'm trying to get at, in some respects, the question you had asked, you were asking before about is it -- if every gas station has at least some level of pollutants, does that mean we can never build a gas station. So --
MR. SILVERMAN: That's a good question.
BY MS. CORDRY:
Q -- so one of the questions is --
MR. GROSSMAN: All right. Well, you can ask him that question.
MS. CORDRY: Okay. All right. All right.
MS. ADELMAN: Yes, exactly.
MR. SILVERMAN: That's a good one.
THE WITNESS: So say it again.
BY MS. CORDRY:
Q It probably isn't your, really your question there, but okay.
MR. GROSSMAN: If every gas station has some level of pollutants, given the fact that you have no threshold for some, no -- at least no determined threshold at this point for some of the pollutants, does that mean you can never build a gas station?
THE WITNESS: So I don't think it means that.

Right? And so it depends on a couple of things. So clearly the size of the gas station matters, right? And where it is matters, right? And how close the receptors are -- in this case, that's a modeling term for people, right? How close are --
MR. GROSSMAN: Right.
THE WITNESS: -- the people, right? So a big gas station that's in the middle of nowhere is not the same concern as a big gas station that's in the middle of a lot of people. You know, a small gas station, you know, is probably less of a risk than a big gas station because the source term is small in that case.
So the size of the source term, the location of the receptors or the people relative to that source term are all things you have to consider in terms of whether you think this is an acceptable scenario or not. And I don't think that puts you in a position where you can never have a gas station, and I think you just have to weigh kind of, you know, what are the risks, what are the benefits and, you know, what's the best place to put something relative to those risks and benefits.
MR. GROSSMAN: It's a judgment call?
THE WITNESS: (No audible response.)
BY MS. CORDRY:
Q In terms --

MR. GROSSMAN: You have to answer yes or no.
THE WITNESS: Yes.
MR. GROSSMAN: Okay.
BY MS. CORDRY:
Q All right. In terms of a typical gas station versus this station, what is your understanding of how this station would compare to a standard neighborhood sort of gas station?
A Well, it's much, much bigger. Do I have to be more quantitative than that?
Q Are there other aspects of it that you think are different than a standard gas station?
A Well, I think because it's bigger --
MR. GROSSMAN: I think you may be outside of what he said is his area of expertise here. Does he purport to be an expert in different size of gas stations? I don't think that that was offered as his area of expertise.
MS. CORDRY: Okay. No, but I think we all, or we all have a great deal of personal experience with a neighborhood gas station.
BY MS. CORDRY:
Q And compared to a neighborhood gas station, are there aspects of this station that you would view as unusual and that would contribute to your concerns about air pollution?

MR. GROSSMAN: I still have a problem with that question, but I haven't heard an objection. So --
MR. GOECKE: Objection. I don't think that the size of the gas station is something we need expert testimony on.
MR. GROSSMAN: Well, I don't know about that. I'm just saying that, that just the way it's phrased, it's so kind of loosey-goosey in terms of whether he's, there's something to be concerned about. I mean, I think he's -- he's a highly qualified expert in a certain area. Let's ask him questions about --
MS. CORDRY: Well --
MR. GROSSMAN: -- about that.
MS. CORDRY: -- I am, but I'm also trying not to lead him. So I'm trying to say --
MR. GROSSMAN: Well, I know.
MS. CORDRY: -- with respect to what you have been told about this gas station and the way of its operations, are there things that you, and you can articulate those -- I mean, I can ask him does the idling cause you a concern, but that's kind of leading.
MR. GROSSMAN: No, it's not necessarily leading. It --
MS. CORDRY: All right.
MR. GROSSMAN: -- depends on whether you're

assuming something that's not in evidence --
MS. CORDRY: All right.
MR. GROSSMAN: -- here. That's what really --
MS. CORDRY: All right. Well, then let me --
MR. GROSSMAN: -- the question of what's leading, because it depends on what's in evidence and what you're assuming. You can ask him hypothetical questions based on a set of things that are in evidence.
MS. CORDRY: All right.
MR. GROSSMAN: That's a legitimate use of an expert.
MS. CORDRY: All right.
BY MS. CORDRY:
Q If the evidence in this case indicates that there is likely to be idling for a substantial period of each day of operation in the range of perhaps as many as 20 to 40 cars -- and I believe that is a fair statement of the evidence -- does that cause you concern with respect to these pollution issues that you would have or not have with respect to a standard gas station?
A I think it's clearly part of, part of the concern. So if we treat the gas station as a source, right, as a source of pollution, the question is, is that source going to put a recognizable health effect to the people living around that? We need to know how big the source is and what

are the different factors that are contributing to the pollutants that might be produced from that. So clearly, the number of cars queuing up are part of that picture; how long they're idling for, part of that picture. So all these things, I think, kind of speak to kind of how big the source is in terms of the pollution that's going to be produced from that source.
Q Okay. I'd like you to look at two slides that were taken from Mr. Sullivan's PowerPoint, and this would have been Exhibit 174.
MR. GROSSMAN: Is it --
MS. ADELMAN: Do you have this, Dr. Breysse?
MS. CORDRY: Yes, he has it. He has copies of all the exhibits.
BY MS. CORDRY:
Q On these slides one is labeled a 12-Million-Gallon-A-Year Station with Vent Controls at 99.7 Percent in 2013 Similar to Smaller Stations in 1980s and 1990s and Will Continue to Drop. The other one is labeled Typical Gas Station Versus Costco with the typical gas station being listed as having, I think that's indicated, as a 1.5-million-gallon level versus the Costco at 12 million.
So looking at these two slides and the statement there that the station is not unprecedented because the levels here are comparable to those of a 1.5-million-gallon

station in 1987, a three-million-gallon station in 1998, can you comment on those slides in terms of how you would view those in the sense of whether this is an appropriate statement about whether a gas station is safe, unsafe?
A I don't know whether they're unprecedented or not speaks to safety at all. It's not clear to me. I mean, of course, there -- you know, it used to be unprecedented to put lead in gasoline, but you know, we took the lead gasoline out because we didn't think it was safe. These levels are going down over time, you know, for a reason because people decided, you know, that VOC emissions were unacceptable. And so whether they're unprecedented or not, you can certainly go back in time and probably find any, any -- anything we see today might be kind of commonly existing in the past. So I'm not sure what that means. I don't disagree that it's unprecedented, but I'm not quite sure what that means.
MR. GROSSMAN: You're saying, even though it might have occurred before, that might have been a health hazard before; is that what you're saying?
THE WITNESS: Sure. Yeah. There's nothing in this that suggests, that implies anything that's safer about today than it does about what was safe back in, you know, 2000 or 1985.
BY MS. CORDRY:

Q But if this station, if you look at the second slide, out through 2025, is still projected to be somewhat more than twice the levels of a typical gas station, is that an issue that raises concern for you?
A Well, you know, it still speaks to that source term. Right? This is still a big source, right, and it's bigger than these other sources. And the fact that it's emitting things that might have been similar to things in the past, you know, is a good kind of historical anchor, I think, but I don't think it helps me kind of make a decision about the acceptability of the health consequences or not.
Q And that happens to be for VOCs. Would you expect to see a similar kind of change in emissions and levels for NO2 and PM2.5 over this kind of a time period?
MR. GROSSMAN: Are you asking him whether he would expect to have, see a decline in emissions of those particular substances for a gas station?
MS. CORDRY: Yes.
BY MS. CORDRY:
Q If you prepared a similar chart for PM2.5 and NO2 over this time period, do those also have drop-offs in levels?
A I don't know if I can answer that. I'm not -- you know, I could think that might, but I, you know, I'm not quite sure that VOCs are going to work the same way as like

PM and NO2 is going to work. There's, you know -- but the change over time is just not all that informative to me. So I wouldn't --

Q I think the question I was trying to phrase -- and we may get at it with a later exhibit -- is, has there been drop-offs in PM2.5 levels and NO2 levels over time --

A Oh, certainly, yeah.

Q -- in the same way?

A Yeah.

Q So if you prepared a similar chart to this for PM2.5 or NO2, you could similarly show that at some point in the past there were levels as high?

A Well, but this is, this is emission rates at a gas station. So --

Q Right.

A -- if you're asking me did, are the, are pollutants going down over time, the answer is yes, but can I say that the emission rates over time at a gas station kind of for these other pollutants follows these graphs or not, I don't know the answer to that --

Q Okay.

A -- if you don't mind me saying that.

Q But it's fair to say the ambient levels are going down over time?

A Yeah. Yeah.

Q Okay, fine.

MR. GROSSMAN: You know, I neglected to take a mid-morning break here.

MS. CORDRY: Yes. Actually, I was -- let me see.

MR. GROSSMAN: Is this a good time to do that?

MS. CORDRY: Actually, I have maybe one more question. Let me --

MR. GROSSMAN: Okay, sure.

MS. CORDRY: -- just see about this one and then that would be a good place to take a break. So -- let me see. This is a fine place. We'll take a break at this time.

MR. GROSSMAN: All right. It's five to 12:00. Let's come back about 12 O'clock.

(Whereupon, a brief recess was taken.)

MS. CORDRY: Okay.

MR. GROSSMAN: You may proceed, Ms. Cordry.

MS. CORDRY: All right.

BY MS. CORDRY:

Q So just to sum up, assuming that the evidence does not establish a threshold for NO2 or PM2.5, how does that affect your views about whether this particular gas station should be located in this, sited in this location?

A So I think you have to be very careful about siting this size of a gas station in that location given

that we're constantly reevaluating our concern about levels of air pollution, we're concerned about the concentration of pollution that this gas station represents, especially if you consider that they're moving -- you know, if the trade-off is between, you know, 10 small gas stations dispersed around the neighborhood versus one giant one, clearly, I think, the scale then becomes kind of the issue. And if we're shifting the risk from these 10 small scales to one giant one, I think we do have a different situation in that case, and just considering things like the number of vehicles, idling time, and so forth, I think, creates a public health concern.

Q Okay. All right. Turning more specifically now to mobile source pollution issues, you did describe earlier that you had done a number of studies in that area and that you looked at both PM2.5 and NO2. Have you looked at those pollutants in contexts other than specifically emitted by vehicles?

A Well, like I said before, our studies generally focus on those pollutants, and we're interested in health effects and the concentrations at which those health effects manifest themself without particular regard to where they come from, and that's informative to the EPA because, you know, the EPA is interested in kind of seeing where the health effects and exposures kind of coincide. And so the

fact that we're looking indoors is different than setting a gas station, but you know, NO2 is not any different indoors than it is outdoors, and if there's levels of NO2 indoors that are causing a health effect, that still kind of informs in the process.

Q You've been doing indoor pollution studies?

A Yes.

Q Okay. All right.

A Yeah, and outdoors, but more indoors than outdoors.

Q Okay. And can you just describe very briefly some of the health effects that you are aware of from exposure to NO2 or PM2.5?

A So, you know, the literature kind of suggests a wide range of health effects for particulate matter. Particulate matter increases morbidity, the rate at which people die, I mean, the rate at which people get sick; mortality, the rate at which people die. In terms of morbidity, there's a wide range of morbidities that are well accepted, from a variety of cardiovascular and respiratory diseases.

In addition, there's growing evidence that particulate matter can have some wider-ranging effects. There's studies out of New York that suggest that PAH components is a marker of traffic-related pollution that

affects childhood development similar to what lead does; so homes with higher PAHs, and they specifically say that PAHs, traffic-related PAHs --

MR. GROSSMAN: PIH being?

THE WITNESS: PAHs, polyaromatic hydrocarbons, so it's one of those complex molecules that's produced from traffic pollutant. And they show that kids have developmental disabilities in terms of IQ deficits and behavioral problems that are similar to lead. Science like that is very provocative but needs to be kind of, you know, reproduced elsewhere, but for now that's a good finding.

So we're exploring a range of health effects from -- increased traffic-related pollutions can affect childhood lung development. Some of the stuff out of Southern California, I think, is really remarkable. So I'm not a pulmonologist, but based on our studies, I know that when you're born, you have a certain amount of lung capacity, right, and we use that throughout our lives, and as we get older, that lung capacity declines, but a healthy person has enough reserve, unless there's something going on, that, you know, until you get really old, perhaps your lung capacity is more insufficient to maintain your daily activities, but the suggestion that kids who live next to freeways have high traffic-related pollution start off with a lung function deficit compared to kids who don't, which was concluded in

the Southern California studies, I think is a, like I said, is a phenomenally important kind of observation. And what that means for them later in their life is something we don't know, but you can only predict that, or you worry that that lung reserve that most of us have perhaps isn't going to be as strong or be there like in these kids.

So things like, like lung development in kids, behavioral developments in kids are all kind of, I think, very important findings. And our recent studies on air pollution, by the way, and COPD is a pretty new kind of finding as well. You know, COPD is thought of being just a smoker's disease, and people didn't do a lot of research on COPD, but among people who have COPD, chronic obstructive pulmonary disease, who've quit smoking, their exacerbations, I think, are, the consensus is, are pretty clearly related to traffic-related kind of air pollutant exposures.

BY MS. CORDRY:

Q Okay. And we'll come back to those in just a moment. Can you tell us, are you aware of governmental regulatory efforts to limit exposure to those substances?

A I assume you're referring to the --

Q PM2 point --

A -- National Ambient Air Quality Standards.

Q Yes. Okay. Are you generally familiar with the process by which those standards are set?

A Yes.

Q Okay. And where did you get that familiarity from?

A Years of working in the field, reading about it, going to meetings where it's talked about --

Q Are there --

A -- I know people who serve on, close colleagues serve on the Clean Air Scientific Advisory Committee for the EPA.

Q Was Dr. Jonathan Samet, is that someone in particular that you know?

A Yes, a very, very close colleague of mine. He --

Q And what was --

A -- chaired the CASAC for a while, and Mr. Ron White is also a close colleague. He served on the Particulate Matter CASAC.

MR. GROSSMAN: What's the relevance of that?

MS. CORDRY: Just that he's familiar with this process of how the standards are set.

MR. GROSSMAN: Well, you've --

MS. CORDRY: Okay.

MR. GROSSMAN: -- qualified him as an expert. So --

MS. CORDRY: Okay. All right. All right. So I just want --

MR. GROSSMAN: -- you don't have to go into that again.

MS. CORDRY: Okay. All right.

BY MS. CORDRY:

Q And I believe you testified that you're aware that these levels have changed over time. What direction have the levels, the permissible levels changed, in your --

A Sometimes they stay the same when EPA kind of reevaluates them every five some-odd years, but otherwise, they always go down.

Q Have you ever seen one go up?

A No.

Q Okay. And they are reevaluated why?

A Well, it's a congressional mandate --

Q Okay.

A -- that EPA kind of reevaluate them and that's -- and it was written that way because they knew that the health effects evidence base is going to change over time and they need, the EPA needs to periodically reevaluate the evidence base that supports the current standard and see if they need to revise it based on that new evidence base.

Q And if a standard changes, doesn't stay the same, if it changes, why would it change?

A Well, it would change because there's a publication suggesting there are health effects at a lower

level.
MR. GROSSMAN: Ms. Cordry, how does this help me make a recommendation on this? The witness has testified that he has concerns that if you have a larger station, you have to be careful. I mean, how does that allow me to, or help me make a recommendation without telling me what levels I need to look at to determine that a risk is inappropriate?
MS. CORDRY: Okay. I am getting there. I am trying to do this in a --
MR. GROSSMAN: Very slowly.
MS. CORDRY: Well, I'm trying to do it in a logical fashion, set up his familiarity with these --
MR. GROSSMAN: All right.
MS. CORDRY: -- and why they change, and that --
MR. GROSSMAN: Well, we assume he's familiar with it.
MS. CORDRY: Okay. All right. We will be there shortly.
MR. GROSSMAN: All right.
BY MS. CORDRY:
Q All right. Can you explain how the air quality standards are supposed to deal with particular populations?
A Well, they're mandated, the EPA, to deal with susceptible populations and that creates kind of a challenge for, well, all populations but particularly kind of

susceptible population. That creates a challenge for the EPA because in even the scientific community we're not quite sure what susceptibility means. You can be susceptible for lots of reasons, but where there are obvious markers of susceptibility, like a kid with asthma, the EPA is required to try and set a standard that's going to be protective for them, but it isn't going to be protective for 100 percent of the people, including, there's going to be some people who have unique susceptibilities that are kind of unknown or not well understood that are not going to be protected.
Q Do you understand whether or not the standard is to be set at a level that creates zero risk?
A Oh, it's not supposed to be zero risk, no.
Q Or that protects the very most sensitive populations?
A It affects the sensitive populations that can be defined and, clearly, kind of have been evaluated, and there's data to suggest it is, but there's no way it's going to affect every possible sensitive person.
Q Are you aware of the existence of the Stephen Knolls School?
A Yes.
Q Okay. And I'm going to point it out to you on the map here.
MR. GROSSMAN: That's Exhibit?

MS. CORDRY: 159.
MR. GROSSMAN: Okay.
MS. CORDRY: And I think the testimony has been that the distance from the station to the edge of the property is about 850 feet.
MR. GROSSMAN: Something in that arena, I believe.
MS. CORDRY: Okay. All right. Give or take. Certainly less than 1,000 feet.
MR. GROSSMAN: Right.
BY MS. CORDRY:
Q What do you know about the student body at the Stephen Knolls School?
A So I know they have a lot of physical challenges, and I know they have a lot of physical challenges, some of them are to respiratory in nature. So they're, they're going to be kind of particularly vulnerable, I think, to pollutions in general but any increased pollution that might be associated with a new source in the neighborhood.
Q So would you consider them equivalent to children in general --
A No. They're --
Q -- in terms of susceptibility?
A I think, based on my understanding, they're more susceptible perhaps than the average healthy child.
Q Is it your understanding that the existence of

these air quality standards are meant to preclude a regulator from considering whether a particularly sensitive population in the particular location might be more seriously affected?
MR. GOECKE: Objection. Legal conclusion.
MR. GROSSMAN: Yes. I'll sustain that.
BY MS. CORDRY:
Q All right. Dr. Chase was asked on September 16th in his testimony whether the standards specifically are, quote, designed to protect children at that school, i.e., the Stephen Knolls School. His answer was yes. Do you agree or disagree with that statement?
A You know, I don't think it was, based on my understanding of the kids at that school. I think they have unique susceptibilities there that perhaps were not on the radar of EPA, and I certainly know of no, no studies that would allow EPA to have an evidence base in which to kind of design a standard that would be protective for kids with that level of disability.
Q Okay. In his testimony, Dr. Chase said that the NAAQS, the N-A-A-Q-S, these standards, were the, quote, the CASAC standards -- he said that at page 51; that the CASAC members, quote, formulate the recommended standards, page 52; and that the EPA standards are, quote, based totally on CASAC recommendations, also on page 52.

MR. GROSSMAN: Page 52 of what?
MS. CORDRY: Of, I'm sorry, the testimony on September 16th.
MR. GROSSMAN: That's the transcript page?
MS. CORDRY: Yes, the transcript testimony, yes.
BY MS. CORDRY:
Q To your knowledge, is that an accurate characterization of the role of CASAC in setting the standards?
A My understanding is that CASAC reviews the literature and recommends a range of values to the administrator that says we suggest that you set a standard within this range of things. They do not set the standard. They give the administrator some leeway to kind of set the standard within that kind of range. They think that they -- they'll say things like, we think there's health effects down to 50 but maybe we're less certain about that but clearly there's health effects between 75 and 100, we think you should set the standard between 75 and 100.
At that point, the EPA administrator is free to kind of do whatever they want, and in fact, there's been cases when the EPA administrator sets standards higher than what CASAC recommended. That usually creates some sort of difficulty, and in the one case, in particular, recently in particulate matter, the chair of the CASAC committee wrote

a, you know, pretty public letter to the head of the EPA, saying, you know, why did you go outside our range, which eventually resulted in lowering it back down to within the CASAC range. So they don't give a number; they give a range.
Q Do you know how that lowering came about? Was that from anything CASAC itself did?
A I think there were some lawsuits involved with it as well.
Q Okay. Not brought by CASAC or --
A No. I don't think CASAC sues.
Q Okay. All right. So in terms of looking at the --
MR. GROSSMAN: Is the witness referring to the U.S. Court of Appeals opinion --
MS. CORDRY: Yes.
MR. GROSSMAN: -- that's been decided --
MS. CORDRY: Yes.
MR. GROSSMAN: -- that --
MS. CORDRY: Yes.
MR. GROSSMAN: -- U.S. Court of Appeals, D.C. --
MS. CORDRY: Right.
MR. GROSSMAN: -- Sierra Club case?
MS. CORDRY: Right.
MR. GROSSMAN: Okay.

MR. SILVERMAN: No.
MS. CORDRY: No.
MR. SILVERMAN: No. These are other cases.
MS. CORDRY: The Sierra Club case was the, setting the SIL level. This was actually a couple --
MR. GROSSMAN: Right.
MS. CORDRY: -- this was actually one that was a couple years earlier. The EPA had, I think, had not wanted to set the level -- we haven't gone into that rule-making. That was several years ago.
MR. GROSSMAN: Right, I mean, but an oblique reference has been made to a case. I just --
MS. CORDRY: Right.
MR. GROSSMAN: -- want to make sure that we're talking about a case -- so obviously I was thinking of a different case.
MS. CORDRY: Right.
MR. SILVERMAN: Yes, right.
MR. GROSSMAN: So --
MS. CORDRY: It was a different case. This one, this case, it's referred to, if it's important, it's referred to actually, if you wanted to see it, it's referred to in the description of the, in the rule, as to how they got to setting this particular standard.
MR. GROSSMAN: Yes, I don't know if it's

important, but just --
MS. CORDRY: Right.
MR. GROSSMAN: -- since the reference has been made --
MS. CORDRY: Right.
MR. GROSSMAN: -- to a case, we ought to make sure that the record is clear as to what case you're referring to.
MS. CORDRY: Right. Yes. At page 3093 on the Federal Register, which is 424(f), it talks about litigation relating to those 2006 PM standards, and those were the ones that were not -- they didn't accept the CASAC recommendations. A variety of people, not including CASAC, challenged them, and it was sent back eventually, and the new review was the one that came out with the --
MR. GROSSMAN: It doesn't cite to the specific case there?
MS. CORDRY: It probably does. Let me see. Actually, it looks like, if I'm reading this right, yes, American Farm Bureau Federation versus EPA, 559 F.3d 512, D.C. Circuit (2009), and it just says: The court remanded the primary annual PM2.5 NAAQS to the EPA because the EPA failed to adequately explain why the standard provided the requisite protection from both short- and long-term exposures to fine particles, including protection for

at-risk populations, such as children.
MR. GROSSMAN: What's the date of that decision?
MS. CORDRY: 2009.
MR. GROSSMAN: Okay. Thank you.
MS. CORDRY: So that returned review was what then eventually became the standard that came out right at the end of 2002 and the beginning of 2013.
MR. GROSSMAN: Okay.
MS. CORDRY: Okay.
BY MS. CORDRY:
Q So in terms of this process of setting standards, what evidence does the EPA look at?
A So the breadth of evidence, from animal studies to controlled human studies to observation on human EPID studies.
Q And how up to date are the studies that go into the setting of a particular rule?
A So, unfortunately, they're always a little -- the current standard is always a little bit behind, right, and that's just kind of the nature of kind of the regulatory process. Right? So, at some point, they have to say we're going to review studies up to some date. Right? So they cut the date off and they compile the studies. Now, clearly, the science doesn't stop at that point, but I think if some kind of monster kind of study came out kind of

before they finalized their answer, they'd look at it, but in general, they cut the studies off. Then it takes them a while, a year or so, to kind of update it, and then the standard can be placed for five years.
So the standard today, you know, could, in some case, be six to seven years kind of behind the time in terms of the scientific literature, which is why they kind of mandate that they periodically update. So even when they promulgate it, it's behind, you know, perhaps by a year. And then certainly by the end of its cycle, you know, you could have five or six years' worth of literature that's not reflected in the current number.
Q Okay. If I could refer you to the, Exhibit 424(b) where it says the cutoff date for NO2 was mid-2008. So is that what you're discussing?
A Right.
Q Okay. So, at this point, we're five-and-a-half years of more studies down the road since then. Okay. And are you aware of what the current NAAQS standards are for NO2 and PM2.5?
A I usually have to look them up, but I keep them not too far from, from my, from my desk, but I --
Q Okay. I'll proffer to you for the point of keeping track of this as we're going along that they're 53 for NO2 --

A Right.
Q -- and 100 parts per billion -- annual level -- and 100 parts per billion for the one-hour level and 12 micrograms per meter cubed for PM2.5 for the annual level and 35 for a 24-hour standard. Hearing no disagreement, we can, we can work with those bases. Okay.
So I'd like to ask you some questions about how -- what those numbers mean and how they're arrived at, how they're applied. Let's start with the NO2. Until recently, until this 2010 standard that came out, there was only a rule for annual exposures, is that correct?
A Correct.
Q Okay. Can you give us some understanding from your knowledge and from the terms of the new rule what led them to put a one-hour standard in in 2010?
A Okay. So this is a perfect example of how the EPA has to catch up to the science. It had been known for a while that -- you know, NO2 is an irritant gas. It causes irritation to your mucous membrane, to your respiratory tract, and certain diseases are exacerbated by irritation. And for a long time they thought the effect was just kind of a chronic kind of accumulation of irritation, and in that case they set the standard on an annual basis based on that understanding, but the -- the science kind of was emerging actually well before this.

Short-term high exposures to NO2 creates, you know, inflammation in your lungs that's acutely dangerous, not just chronically dangerous. And so the acute exposure requires the EPA to think of an averaging time that's shorter than a year, and in fact, in this case, they show that you can have a pretty quick response to a high level exposure to NO2. And so the EPA says we want to, we want to keep the one-hour average below some level that we think is safe and, if we can do that, I think we can, we can effect these short-term kind of acute exposures that create these short-term kind of acute health effects.
Q Okay. And in terms of determining how to set that level, was there particular aspects of the way that NO2 appears in the air that related to that?
A So NO2 is a challenge. So EPA has to do two things. Right? There's two challenges. One is they have to figure out what a safe number is, and then they have to figure out how to enforce it.
So PM2.5 is easy in, easy in one regard, if I can digress for a minute, because it's relatively homogenous in space in an urban area. NO2, however, we know from early on, from many studies, it's very heterogeneous. Right? So you can -- close to sources it can be high; farther, it can be lower -- and if you want to limit kind of a population average to a one-hour exposure below some level -- you know,

EPA can't put a monitor everywhere, right, and they can't, you know, and they can't even put tons of monitors; there's actually very few monitors. So the EPA has to come up with a strategy that they think is protective that represents kind of -- that's wedded to a monitoring approach. And so the approach the EPA took is they said we want to, we want to create a one-hour standard that represents the 98th percentile of a distribution -- so this is the peak value that they have -- and they say we want to, we'd love to be able to set that one-hour 98th percentile across the whole area but we can't do that, and in fact, they say they think the evidence suggests that that safe level should be somewhere around 75 to 85 parts per billion, but they said we're going to put standards next to the roadway, monitoring equipment next to roadways, next to high source, and we're going to say they can't be over 100 parts per billion and, if we keep those below 100 per billion, we're probably keeping this spatial, kind of peak value kind of far from that, less than 75 to 80.

So it's a little bit nuanced because the standard says, you know, 100 parts per billion, but that standard is key to kind of this regulatory measurement approach, but if you read the evidence, it's very clear that the EPA administrator thinks that the, the health threshold for NO2 is clearly, you know, 75 to 85 parts per billion, and they

even say in their record that they suggest that there's pretty good evidence that it's down to like 50 parts per billion. And so that's really their target --

MR. GROSSMAN: It's down to 50 parts per billion --

THE WITNESS: Right, but the evidence becomes less certain down to 50, but they're very certain about it between 75 and 80, and there's a number of statements, and if you read their -- she's very clear about that. And so we don't want to, we don't want to treat the standard as 100 parts per billion meaning that's the standard everywhere. Right? That really just kind of represents kind of that peak kind of value and that's the approach that CASAC recommended to EPA for this kind of spatial reg dealing with the spatial heterogeneity and that's the approach the administrator kind of took.

BY MS. CORDRY:

Q So in determining this -- and this is, this is coming out of the rule is that, correct?

A Yes.

Q Okay. So in determining that, is the rule saying that if the level is 100 on the road, what level is that expecting it to be in the general area? How is setting the road level at 100 supposed to determine the levels off the road?

A Right. So the road level is going to be lower. So if you keep the road level below 100, the levels kind of away from the road should be below 75 to 80, which kind of represents that threshold they think they saw the effect. But remember, even the administrator says that's not a fine line between, you know, above this number is bad, below this number is okay, because the administrator said very clearly, we think the health effects probably go down to about 50.

And so nobody believes the National Ambient Air Quality Standards from anything but a regulatory perspective, in terms of compliance, yes or no, are fine lines. From a health perspective, they're not fine lines. These represent targets: now that we, if we bring the air pollution down, people will be better off, but it certainly doesn't imply that magically above that number is bad and miraculously below that number is good, whether, however you nuance this measurement-strategy approach.

Q Were there particular studies that the EPA was looking at and placed importance on in reaching that conclusion --

A Well, they list --

Q -- about where to set the level?

A They list a number of studies in their, in their, in their criteria review.

Q Actually, if you look at page 6501. I think I've

given you some excerpts from the rule.

MR. GROSSMAN: 6501 of what?

MS. CORDRY: It's Exhibit 424(b).

THE WITNESS: Can you hold it up?

BY MS. CORDRY:

Q Sure.

MR. GOECKE: Do you have the Federal Register cite?

MS. CORDRY: Yes. It's the --

THE WITNESS: The current ISA?

BY MS. CORDRY:

Q No, no. This is the federal rule that is listed as --

A Mine don't have exhibit numbers on it.

Q It's listed as Tuesday, February 9th, 2010.

A Okay.

Q That one.

MS. CORDRY: And the Federal Register cite would be Volume 75, No. 26, as I said, February 9th, 2010. I believe it started at probably page 6474.

MR. GOECKE: So it's 40 CFR?

MS. CORDRY: That's the --

MR. GOECKE: Yes. Thanks.

MS. CORDRY: -- statutory rules. Okay.

BY MS. CORDRY:

Q Actually, can you find page 6501?
A Yeah.
Q Okay. And on the left-hand side there, about midway down the left-hand column --
A Uh-huh.
Q -- are those the studies that you were referring to?
A Sure. Those are all well-known studies looking at NO2 and health effects.
MR. GROSSMAN: This is: A cluster of five key U.S. epidemiological studies --
MS. CORDRY: Yes.
MR. GROSSMAN: -- studies; is that what you're referring to?
MS. CORDRY: Right.
THE WITNESS: So I think this speaks to the judgment of the administrator when they concluded from their assessment that the health effects in these studies suggest that the NO2 concentration is down to 85 to 94 parts per billion, which all these studies are kind of where, where she wants to kind of set the standard to protect people against.
BY MS. CORDRY:
Q And can you look on the middle column there, the paragraph that starts: Given these considerations? And can

you read that sentence or two?
A Given these considerations, the administrator continues that epidemiologic evidence provides strong support for setting the standard limits -- for setting a standard that limits the 98th percentile of the distribution of one-hour daily maximums, sorry, one-hour daily maximum area-wide NO2 concentrations to below 85 parts per billion.
Q And --
A All right. So this speaks to that kind of roadside approach versus kind of the peak kind of average exposure kind of away from the roadside.
Q Right. If you go down one more paragraph below that, it starts out: In considering specific standard levels.
A Uh-huh.
Q And, again, can you read that or summarize that paragraph in the next, in the two bullet points there?
A So, in considering specific standard levels supported by the epidemiologic evidence, the administrator notes that the level of 100 parts per billion, for a standard reflecting the maximum allowable NO2 concentration anywhere in the area, would be expected to maintain the area-wide NO2 concentrations well below 85 parts per billion. And here they refer to those cluster of five studies. So --

Q Right.
A -- again, the aim of this standard is to kind of keep this area-wide one-hour maximum level, you know, below 85.
Q Actually, can you read those two bullet points there then?
A If NO2 concentrations near roadways are 100 percent higher than concentrations away from roads, the standard level of 100 parts per billion would limit area-wide concentrations to approximately 50 parts per billion.
If NO2 concentrations near roadways are 30 percent higher than the standard concentrations away from the roadways, the standard level of 100 parts per billion would limit area-wide concentrations to approximately 75 parts per billion.
So this speaks to that spatial heterogeneity. Right? So if the roadway is 100 percent higher than away from the roadway, then setting the roadway at 100 will mean the area-wide average should be kind of below 50. If the roadway is only 30 percent higher, then it would still set it at 75. So the administrator is saying I think there's some, there's some protection here, because in reality, you know, it states elsewhere in here that this spatial heterogeneity is such that the near-roadway exposures are,

you know, 30 percent to 100 percent higher than the far-from-roadway exposures.
All right. So this is just a, this is just a regulatory monitoring strategy approach that the administrator has taken to ensure that this broad area of exposures are acceptable, not that the standard is 100 for everybody.
Q And, again, going back to those studies, what's the significance of those studies?
A Well, those studies all saw, all saw exposure in health effects in this range. Right? And so the EPA administrator very clearly wants to kind of, since this is the evidence base, these five studies, very clear evidence base that health effects are occurring down to 85 parts per billion, these one-hour averages, and the EPA, the EPA regulator is setting a science, saying, I think the best science is in these five studies and I'm going to hang my hat on these five studies.
Q Okay.
MR. GROSSMAN: So I take it that what the opposition is saying is that the actual EPA National Ambient Air Quality Standard area-wide for one-hour NO2 concentrations is actually somewhere 50 to 75 parts per billion rather than 100 parts per billion; is that what you're suggesting by this?

MS. CORDRY: Yes. What we're saying is that --
MR. GROSSMAN: Okay.
MS. CORDRY: -- by setting it at 100, she's saying that's where we expect -- if we don't let it get above 100 at the highest point anywhere, like on the roadways, that will assure that we keep the area-wide areas off the roadways down to 50 to 75 parts per billion --
MR. GROSSMAN: Right. I just want to --
MS. CORDRY: -- because we are seeing health effects below 100 parts per billion.
MR. GROSSMAN: I understand.
MS. CORDRY: Okay. All right.
MR. GROSSMAN: While Ms. Cordry is looking through her papers, do you have any estimate of if, if you had a concentration at, let's say, 100 parts per billion of NO2 near a roadway, what would the concentrations be 850 feet from a roadway?
THE WITNESS: I'd have to, I'd have to kind of look at some of the data, but I would think at a -- it would be somewhere between, I think, you know, 30 percent of that to 100, one half of that, based on the EPA administrator suggesting that the distribution kind of ranges away from roadways to between 30 percent and, you know, 100 percent.
BY MS. CORDRY:
Q And those are reductions, you mean --

A Right, yeah.
Q -- 30 percent lower to 100 percent lower? So --
A Yeah.
Q -- so it would be 50 percent off the roadway?
MR. GROSSMAN: Well, yes, that's the question. Are you saying that if you were 850 feet away --
THE WITNESS: I don't know that exact distance. I --
MR. GROSSMAN: Right. The reason I chose that figure is you mentioned in the testimony the Stephen Knolls School, which is about 850 feet away from the source. So I used that distance.
THE WITNESS: Right.
MR. GROSSMAN: And are you saying that you're estimating that the reduction in concentration would be 50 percent to 30 percent of the measurement at the roadway, or are you saying it would be 50 percent to 30 percent lower? I'm not sure what -- are you saying it'll be, end up being --
THE WITNESS: Half --
MR. GROSSMAN: -- 50 percent to 70 percent at the 850, or are you saying it'll be 50 percent to 30 percent?
THE WITNESS: It'll be roughly half to 70 percent of --
MR. GROSSMAN: Okay.

THE WITNESS: -- what's at the roadway. And -- but, you know, that's just based on kind of these general kind of characteristics. In part, you know, I would rely on the, on the modeling that was --
MR. GROSSMAN: Right.
THE WITNESS: -- then done to kind of predict kind of what the levels are.
MR. GROSSMAN: Right. Okay.
BY MS. CORDRY:
Q All right. So speaking of modeling, we can certainly turn to that now, depending on whether it's a good point -- I guess we might as well keep going for a while longer. Okay.
MR. GROSSMAN: Mr. Silverman is not hungry yet.
MS. CORDRY: Not yet.
MR. SILVERMAN: No. This is more appetizing.
MS. CORDRY: Okay.
MR. SILVERMAN: I checked out the lunch before.
MS. ADELMAN: What are we having today? Anything good?
MR. SILVERMAN: Chicken marsala.
MR. SHEVEIKO: It's all going to be gone by the time we get out of here.
BY MS. CORDRY:
Q I've asked you to look at Mr. Sullivan's reports

and a number of his charts that he has done from those in terms of these isopleth charts that he has created. Can you look first at the one that is labeled December 18th, 2012?
MS. CORDRY: And, again, this is in the evidence. This would have been Exhibit 54(b). I am handing out these individual pages.
MR. GROSSMAN: Thank you.
MS. CORDRY: I don't think we need to have these admitted again, but --
MR. GROSSMAN: No.
MS. ADELMAN: Do you have it, Dr. Breysse?
MR. GROSSMAN: But it's --
MS. CORDRY: -- but yes.
THE WITNESS: Mine is not labeled as an exhibit number. Is it Figure 6.3?
BY MS. CORDRY:
Q Yes. It's the one that's labeled Figure 6.3 and has December 18th, 2012, at the top.
A Okay.
Q So if we start applying this discussion that we just had about the EPA rule to some of these results that we're seeing here, this one was done based on his original inputs and with a 28 microgram per meter cubed background. We'll get to the background level later. We'll just start with this one for now. What's the highest point you see

labeled on this, this chart?
A Hundred ninety.
Q Okay. And where are you seeing that?
A Along the roadway, running roughly north-south on the right-hand side.
Q Okay. And if you kind of make a left turn from there at the top, towards the top of the map?
A Yeah. There's another roadway, right.
Q Right. Okay. So is that in fact the kind of on-roadway exposures that was being discussed in the rule?
A Yes.
Q Okay. So according to this chart and the modeling, for the 28 microgram per meter cubed background, we were at the EPA level --
A This is --
Q -- that is not to be exceeded?
A This micrograms per cubic meter. So I have to be careful.
Q Right. Right.
MS. CORDRY: And I did give him, and I think -- did you give Mr. Grossman as well?
MS. ADELMAN: No. I don't do that.
MS. CORDRY: I put together a cheat sheet for him. Again, I don't think this has to be an exhibit, but it has, for a whole series of micrograms per meter and parts per

billion, the conversion factor there.
THE WITNESS: Right. So this is roughly 100 parts per billion.
BY MS. CORDRY:
Q Right.
MR. GROSSMAN: Well, let's make it an exhibit --
MS. CORDRY: All right. If you want to, that's fine.
MR. GROSSMAN: -- since we're going to look at it. And we'll call this Exhibit 439.
MS. CORDRY: And I have given one, obviously, to the other side as well.
MR. GROSSMAN: And we'll call it -- you did this, Ms. Cordry?
MS. CORDRY: Yes, I did this. I --
MR. GROSSMAN: Okay. So --
MS. CORDRY: -- put it on my Excel spreadsheet, and I told it to multiply those out.
MR. GROSSMAN: Okay. Cordry -- are both sheets, are both sheets translations like that?
MS. CORDRY: The second sheet is taking each one of these figures that we have and putting the relevant data in there. So --
MR. GROSSMAN: Okay.
MS. CORDRY: -- it shows, for December 2012 it

shows that it was the rural model. It was based on the November inputs. The background used was a 28. I've got my little Google Earth and measured roughly what the north-south limit was here, just because the charts get smaller and smaller as we go along.
MR. GROSSMAN: All right. So, first of all, let's say page 1 will be 439(a) --
MS. CORDRY: Okay.
MR. GROSSMAN: -- and that's Cordry --
MR. SILVERMAN: Conversion.
MR. GROSSMAN: -- conversion --
MS. CORDRY: Just a list of conversions, yes.
MR. GROSSMAN: -- of parts per billion to micrograms per cubic meter.
(Exhibit No. 439(a) was marked for identification.)
MS. CORDRY: Right.
MR. GROSSMAN: And 439(b) is --
MS. CORDRY: Compiling the data points that are shown on each one of the various --
MR. GROSSMAN: All right.
MS. CORDRY: -- figures that were done there.
MR. GROSSMAN: Cordry compilation of data points from what?
MS. CORDRY: From the various exhibits that are in

Mr. Sullivan's reports that we'll be going through.
MR. GROSSMAN: All right. From Sullivan reports.
(Exhibit No. 439(b) was marked for identification.)
MS. CORDRY: And the one part that I put in there was converting the micrograms per meter cubed to parts per billion.
MR. GROSSMAN: With conversions?
MS. CORDRY: Yes, because most of the studies that we'll be talking about are done in parts per billion but these charts are in micrograms per meter cubed. So --
MR. GROSSMAN: Right. Right.
MS. CORDRY: -- I thought it was easier sometimes to keep the numbers in front of me when I was looking at them.
MR. GROSSMAN: Right. I agree.
MS. CORDRY: Okay. So --
MR. GROSSMAN: All right.
MS. CORDRY: So, again, if we look at, if we look at this chart where it shows that the 190, which equates to the 100 parts per billion, 188 is actually the exact conversion; so technically it's two micrograms over the EPA limit.
BY MS. CORDRY:
Q Can you just describe what that then shows in

terms of the drop-offs and the -- what happens with the rest of the area on the chart?
A All right. So you can see kind of how things, quickly things drop off if you look to the right of the -- I'm sorry. What's this road that runs north-south?
Q That's Georgia Avenue.
A Georgia Avenue. You can see how they kind of fall off, you know, with distance if there's no other source, and you see it gets more complicated as you move in other directions and other roads. And certainly, as you move back towards the -- the model predicts where the service station is going to be; there's another hot spot there down in the center, a little bit down to the left.
MR. GROSSMAN: And I'm sorry. Was the page, the handout you gave from Mr. Sullivan's December 18, 2012, report, is that the background level before or after the correction?
MS. CORDRY: No, this is the, this is the incorrect background level. So even with the --
MR. GROSSMAN: This is incorrect.
MS. CORDRY: -- incorrect background level, we are showing a level at or above the EPA standard on the roads.
MR. GROSSMAN: Okay.
MS. CORDRY: Okay.
BY MS. CORDRY:

Q Okay. Now let's look, the next one would be the January 16th chart. This, again, is labeled Figure 6.3 but should now have the January 16th --
A Yeah.
Q -- it says 2012, but it's actually the 2013 report that he did.
MS. ADELMAN: Is there an exhibit number on this?
MS. CORDRY: That would be Exhibit 56(a).
MS. ADELMAN: What is it? 50?
MS. CORDRY: 56(a).
MS. ADELMAN: And what is the one before that?
MS. CORDRY: That was 54(b).
MS. ADELMAN: 54(b). Thank you.
MR. GROSSMAN: As I recall, the December report was withdrawn or superseded --
MS. CORDRY: Right.
MR. GROSSMAN: -- entirely by the January.
BY MS. CORDRY:
Q One of the things I'd like to ask you is, if you look at between the December report and the November report, I mean, the January report, do these appear to be showing -- the lines appear to be in the same place, the calculation the same, and so forth?
A I'm not quite sure what you're asking.
Q Okay. Do these appear to be showing the same

thing? Are the lines, these isopleth lines, are they in the same locations? Does this appear to be charting the same --
A Well, they're different. Right?
Q Okay. What difference do you see among others?
A Well, for example, the roadway is now 175, whereas before it was 190, is an example. So there's been changes in assumptions that resulted in a change in the output.
Q Okay. If the assumptions didn't change, does that mean the roadway, we simply remove the roadway line, the 190 line on the roadway, we're not showing that one anymore?
A I don't know.
Q Okay. All right.
MR. GOECKE: Are you asking about the lines themselves or the numbers shown on the lines?
MS. CORDRY: Well, I'm showing that in December he showed a 190 line. In the January report, that line isn't there anymore. I don't think anything changed in his assumptions or his modeling. I think it's just not being shown, that interior line, anymore. I'm not quite sure why, but --
MS. ADELMAN: That's the Georgia Avenue?
MS. CORDRY: Yes.
MR. GROSSMAN: Well, just so I understand you, are you suggesting that the removal of the line changed the other numbers?

MS. CORDRY: No. I'm saying that what we don't see anymore in this report, which was the official report, is that 190 line, which, from the exact same modeling, was shown before and now has been taken out. It's not that it's not -- that it doesn't go up to 190 anymore. It just, it's just not being shown on this chart anymore, and this was the chart that's being relied on then to discuss these things. So now we don't -- in other words, in January we don't see a 190 line anymore.
MR. GROSSMAN: I understand. I just wanted to make sure I --
MS. CORDRY: Right.
MR. GROSSMAN: -- understood whether you were implying that somehow the absence of that line changed the other numbers.
MS. CORDRY: No. No.
MR. GROSSMAN: Okay.
MS. CORDRY: I'm just suggesting that the line has been removed for --
MR. GROSSMAN: The line is not there. Okay.
MS. CORDRY: -- whatever reasons it was removed, but --
MR. GROSSMAN: Right.
MS. CORDRY: So, at this point, looking at this chart, one would -- the most you can see from this chart is

it went up to 175, but when we look at the December chart, we see that there was actually a 190 line there. Okay.

BY MS. CORDRY:

Q And the one other thing that the January chart does is in the top right-hand corner it has a blowup of the gas station area. If you look back at the previous one, were you able to see in that gas station area how high does it get?

A It was hard to read.

Q Okay. So what is the highest line that it shows here now for the gas station?

A One seventy-five.

Q Okay. And looking at your little cheat sheet, a 175 micrograms per meter cubed translates into what number parts per billion?

A Slightly below 95 parts per billion.

Q Okay. And is that in that range of the studies you were just talking about?

A Certainly.

Q Okay. If we look at levels of 85 to 95 parts per billion, that roughly translates into 160 to approximately 180, if we look at our little cheat sheet, and the 50 parts per billion translates into 94 micrograms per meter cubed. Can we look, can we look at this chart, and keeping those kind of numbers in mind, can we look at, for instance, how

far out those, the numbers in the range of 140, I'm sorry, 160 to 180, for instance, go out?

A Karen, Ms. Cordry, are you talking about --

Q I'm sorry.

A -- parts-per-billion units or micrograms/cubic-meter units when you ask me that question?

Q I'm asking in the micrograms per meter cubed, because it's labeled that way here.

A Okay. So the 60 to 70 to 75 micrograms/cubic meter isoconcentration lines go out into the neighborhood.

Q Okay. I'm sorry. Actually, I'm saying 160 to 180.

A Well, there's no 160 or 180 line on the --

Q Okay. So, at this point, under this chart you would not be able to see that the, that levels in the neighborhood -- this would not indicate that levels in the neighborhood were in the 85- to 95-parts-per-billion range, the 160 to 180 micrograms per meter cubed?

A Correct.

Q Okay. And that's with the 28 micrograms background. Okay. Now, are you aware that it's been determined that the background calculations were miscalculated for this diagram?

A Yes.

Q Okay. And that the correct number should have

been 98 and not 28; in other words, that the background level which is shown here is 28 and that it should have been 98?

A Because of the unit conversion.

Q Correct. Okay.

MR. GROSSMAN: Right. Ninety-eight micrograms per cubic meter.

MS. CORDRY: Per meter cubed, right.

BY MS. CORDRY:

Q Now, knowing that -- so that's, that's a 70 microgram per meter cubed difference -- knowing that and looking now at this chart, now what do you look at this chart and see if you add that 70 on?

A So, for example, if we added, you know, 70 to the 75 isopleth line, that now becomes 145, which is well within the range that we see health effects in terms of the literature that the EPA relied on for the previous NO2 standard. So, for example, the 75 line, if we add 70 to that and we convert that to parts per billion, we would get somewhere between, something a little less than 80 parts per billion.

So we're documenting, I think, exposures here that are reaching out into the neighborhood that are well within the range of exposures that the EPA is trying to prevent by regulating NO2 in the previous standard.

Q And if you took the 175 that is now the highest point that's shown either at the station or the roadway and you added 75 to that, I'm sorry, 70 to that, what would you get?

A Then I think you're in an, actually, a noncompliance-type setting. If this was -- if the EPA treated this as a roadway and they put a monitor close to this, I think that based on these numbers and adding the correction factor, 70 micrograms/cubic meter, that you were -- I'd worry that this was actually a non-compliant, this gas station creates a noncompliant situation.

Q And if you look at the pool and the school, the pool is, there's this little black --

MR. GROSSMAN: Well, let me stop you for a second.

MS. CORDRY: Okay.

MR. GROSSMAN: You said this gas station creates. I'm not sure that the question assumes that all of this is created by the gas station, correct?

THE WITNESS: Okay. Right.

MS. CORDRY: Well, what I am asking --

THE WITNESS: This gas station -- the addition of the gas station would create a situation that is noncompliant.

MR. GROSSMAN: Can you tell from this whether the situation, the noncompliant situation existed prior to the

assumption of the addition of the gas station?
THE WITNESS: You'd have to model it without, without that gas station there, and I have not seen those data.
MR. GROSSMAN: Okay.
THE WITNESS: But it would be, it'd be hard to -- I think, I think if we go back to the previous graph and if we look to the right of the road, as you see, if you just move away from the road, you'll see the decline in NO2 concentration without another obvious source. You see how it goes from -- you follow that to the right; it goes from 175 to 150 to 100 to 90 to 80 --
MR. GROSSMAN: You're looking at the one from Exhibit 54(b), the December 18 --
MS. CORDRY: Right. Correct.
THE WITNESS: Yeah.
MR. GROSSMAN: -- one?
THE WITNESS: So I think this represents kind of the natural decline as you move away from a road --
MR. GROSSMAN: Yes.
THE WITNESS: -- right? And I would expect that, absent any other kind of source, that to kind of occur away from that road. And so I would, if we just kind of use my, my finger test, I would think we'd be well down below compliance levels based on the natural decay that we see

from that roadway to the right-hand side.
MR. GROSSMAN: Well, you're suggesting -- I just want to understand what you're -- are you suggesting that your assumption is that the addition of the gas station, let's say, we're talking now around where the Stephen Knolls School is, has moved the needle --
THE WITNESS: Yes.
MR. GROSSMAN: -- that far --
THE WITNESS: Yeah.
MR. GROSSMAN: -- at that distance?
THE WITNESS: Yeah.
MR. GROSSMAN: All right. And do you have --
MS. CORDRY: Well, I'm not sure what your question --
MR. GROSSMAN: Ms. Cordry, are you suggesting the data suggests that?
MS. CORDRY: Well, I'm not sure what your question is.
MR. GROSSMAN: My question is this: Dr. Breysse answered an earlier question by indicating that the gas station had created this exceedance, or apparent exceedance, if not of the NAAQS standard, then at least of the administrator's, I don't want to say preference, but suggestion that that area-wide should be between the 50 to 80 parts per billion and that that level would be exceeded

in that area, and he suggested that that was created by the addition of the gas station. And I'm asking, I'm trying to pin down whether or not in fact this is a situation that exists now, regardless of the gas station, in terms of NO2 one-hour concentrations 850 feet from the gas station --
MS. CORDRY: Well, okay.
MR. GROSSMAN: -- because my, my recollection of the study, the Sullivan study, is that at that distance the addition of NO2 was very attenuated, as well as other things as well, and I just wondered whether or not there's an assumption being made here that this is all caused by the gas station when this is just preexisting.
MS. CORDRY: Well, number one, we don't have any studies of preexisting pollution. So, again, I think to hold us to tell you what the preexisting pollutions is, I think, is not our job. But in terms of is the overall area pollution comprised of a number of sources, obviously yes. It's obviously not coming all just from the gas station, but I think what we said, what the Planning Board staff said is, that you can tell from this, is you had levels on the roadway that under this modeling would be an exceedance, which means the area is in exceedance, which means, overall, you have a problem --
MR. GROSSMAN: Right.
MS. CORDRY: -- that those levels would drop off,

that you would not have -- you'd have a buffer zone from the road absent the gas station and, by putting that in there, you have eroded that buffer, you have pushed the levels back up. Exactly what the contribution is from each source is difficult to say but that you clearly have a new source of pollution creating additional problems, bringing --
MR. GROSSMAN: Right.
MS. CORDRY: -- and the levels near that source are at --
MR. GROSSMAN: I'm not saying there's not --
MS. CORDRY: Okay.
MR. GROSSMAN: -- an argument to be made that there's a question about whether or not you want to add an additional source here. That's not really the question I'm asking. My question is, is it fair to assume that it's the gas station that's creating the symptomatology that is evidenced in the exhibits you've presented --
MS. CORDRY: Well, I don't think -- okay.
MR. GROSSMAN: -- and that's a, I think that's an assumption that Dr. Breysse made in his answer, and I'm not sure that's justified.
MS. CORDRY: Well, I don't think he actually stated that. I think what he was stating was what are the levels that we see here on this chart and are those levels at points where there are health effects.

MR. GROSSMAN: No. He said, used the word, created by the gas station. That's why I stopped and asked.
THE WITNESS: So maybe I can be clear.
MR. GROSSMAN: Okay.
THE WITNESS: So --
MR. GROSSMAN: Because that's my concern, is that one can make --
THE WITNESS: So this is --
MR. GROSSMAN: Hold on one second. One can make an argument that you're making -- that is, you've got a problem here, why add to the problem; that's your argument -- but there's also another question which was raised by your statement and that's what I wanted to clarify, whether or not the gas station is the cause or even a significant contributor to the NO2 one-hour problem at the school.
THE WITNESS: Okay. So I think these data say that it's a significant contributor. If you look at the maps, right, there's a hot spot there. Right? Things are not --
MR. GROSSMAN: There's a hot spot where, sir?
THE WITNESS: In the, right -- right in that middle circle area, right there, right where the concentration lines get closer to together and they get higher.
MR. GROSSMAN: Right, but that's not where the

school is.
THE WITNESS: Well --
MR. GROSSMAN: My question actually went to where the Stephen Knolls School is.
THE WITNESS: Right. So --
MR. GROSSMAN: I understand that there's --
THE WITNESS: Yeah.
MR. GROSSMAN: -- there's a significant issue right around there, but I think, as you may not be, you know, weren't exposed perhaps to some of the earlier testimony about concentrations in the area around the gas station coming from the Costco warehouse loading docks, which have nothing to do with what's before me, in a direct way, anyway; so I'm not, I don't know -- I don't want to get back into that at this moment. I'm right now just talking about right around the Stephen Knolls School, 850 or so feet away from the gas station, and whether or not the gas station is actually, as you suggested in your answer, creating the problem.
THE WITNESS: Okay. Perhaps it's contributing to the problem. So it looks like there's a, based on these, this modeling, this number, there's certainly exposures to NO2 in this neighborhood around where the school is that are in the concentrations that we think are going to be bad for kids, particularly kids with respiratory problems.

MR. GROSSMAN: Right.
THE WITNESS: Right? And the gas station, based on these modeling numbers, suggests to me that it's clearly contributing to that.
MR. GROSSMAN: Okay. All right.
BY MS. CORDRY:
Q All right. So just to point out specifically the Stephen Knolls School, can you look at the levels on these isopleths that are shown where that school is?
A Sorry, which one am I looking at again?
Q The Stephen Knolls School, which is the brown place just to the, brown roof, that's just to the right of the --
A Which figure, though, am I looking at again?
Q Looking at the --
A Oh, I'm looking at Figure 6.3 --
Q The -- yes.
A -- January 16th?
Q Yes, the color one, right. And there is a brown-roofed building just to the right of the bottom right-hand corner there.
A Is it outside the red box?
MR. GROSSMAN: Yes.
BY MS. CORDRY:
Q Yes.

A Okay. Yeah. So the isopleth lines there suggest it's, looks like it's between 170, but if we add 70 to that, it's 170 to -- so these suggest that the exposures at school are consistent with what we'd expect health effects to be based on the literature that the EPA administrator cites in her current evaluation on NO2 health effects.
Q And if you look on the, just inside the top left-hand corner of the box, that black, the little black diagram there --
A Uh-huh.
Q -- that's the pool. And, again, in terms of the location of the pool, where is it in terms of these lines here?
A The same, the same.
Q By the same, you mean between the 75 and the 100 --
A Right. Right.
Q -- to which we will add 70 to each one?
A Right.
Q Okay. So you would, again, say that those are within the range of where we have been seeing health effects?
A Right. So this is, this is an area where, if I were the EPA administrator, I'd say we want to be lowering NO2 concentrations, because things seem to be excessive.

Q Okay. So let's turn then to --
MS. CORDRY: If you can hand out, Abigail --
MS. ADELMAN: Yes.
MS. CORDRY: -- this exhibit.
MS. ADELMAN: Which is this? The color --
MS. CORDRY: Yes.
MS. ADELMAN: -- isopleth?
BY MS. CORDRY:
Q These are several of the pages from Exhibit 255, which was the August report, and if you look at the first page there, it's labeled as Figure 1.
A Uh-huh. Yes.
Q And this refers to now having a 98 microgram per meter cubed background. So this is the one that was done after he added in the corrected background. And looking at this one -- so now you don't have to add the numbers on -- can you look at this and tell us for the pool what levels that are shown there?
A Looks like between 160 and 150.
Q Okay.
A Am I reading that right?
Q Right. And what about for the school?
A Roughly the same.
Q Okay. And, again, it's a little difficult to read all the way in the center there, but what -- can you see in

the center what the smallest isopleth line is there?
A It's either 300 or 800.
Q Three hundred, I will bet. At the top it's labeled the maximum equals 388 micrograms per meter cubed. So --
A Okay.
Q And I'm trying to read. And then on the roadways now, for instance, just coming off the right-hand, midway up the right-hand side there on the roadway?
A Three hundred.
Q Okay. So, again, based on the NO2 rule, where are we at in terms of the roadways?
A We're out of -- we're already out of compliance.
Q And the station?
A Out of compliance.
Q By a little bit?
A By a good bit.
Q Okay. In terms of children using the pool -- we already talked about the hypersensitivity of the kids at the Stephen Knolls School -- is there any reason you would think that children exposed at the pool would have a different level of sensitivity than children elsewhere?
A So we expect, you know, based on numbers, for example, 10 to 12 percent of kids to have asthma. Right? So there's likely going to be asthmatic kids there. Asthma

is the most common chronic disease in kids. If they're African Americans, we expect maybe as high as 20 percent of African-American kids to have asthma. So it's a very common disease.
So I suspect there's going to be kids there that would be labeled susceptible in terms of the EPA. I expect -- COPD is a pretty common disease, as well, in terms of adults -- I expect we're going to have susceptible adults who attend this pool or maybe live in this area as well. So I think there's the potential for a variety of susceptible populations to be impacted by these exposures.
Q Okay. And if children are exercising, does that have more or less effect?
A So the data are actually a little bit mixed on that. So, in general, people think exercising is worse, but different things happen when you exercise. So it's probably not as clear, but in particular, I think, if you're an asthmatic kid and you're exercising, depending on what kind of phenotype of asthma you have, what kind of, the way your disease presents itself, it could be a huge contributor or maybe not so big a contributor.
Q Okay. All right. Are you aware that one issue in this case is whether rural versus urban dispersion factors should be used in the air quality monitoring?
A So we've discussed that.

Q Okay. Is that issue an analysis, or is this issue about that something with which you have a lot of familiarity?
A You know, that's -- that probably gets beyond kind of, you know, what I would consider my area of expertise in terms of speaking to the justifiability of that. You know, there's not like one is right and one is wrong.
Q In any case, though, if you were reviewing a study using one method and the proponent says, well, it's really more accurate to do another way, what would you expect the person then to do with the differing analysis?
MR. GROSSMAN: I don't understand that question.
MS. CORDRY: Okay.
BY MS. CORDRY:
Q If somebody comes to you and says, well, this analysis that I did using rural isn't really correct, I really should use the urban model, what would you expect to then get from them in terms of a report?
MR. GROSSMAN: Well, your problem is he's just testified that he's not an expert in that distinction.
MS. CORDRY: Well, I understand. I said, whether he should use one or the other.
BY MS. CORDRY:
Q But if somebody says -- let's see. If somebody says to me, okay, I want to use a different model and a

different approach, what would you then expect to get from that person in terms of their study?
A I think, maybe --
MR. GOECKE: Objection.
BY MS. CORDRY:
Q Would you expect to get a copy of the study with --
MR. GROSSMAN: Well, hold on. Hold on a second.
MS. CORDRY: Okay.
MR. GROSSMAN: I think it's a problematic question. I'm going to let him take a stab at answering it --
MS. CORDRY: Okay.
MR. GROSSMAN: -- but I think it's a problematic question since he's already just said he's not an expert in this area. So I will --
MS. CORDRY: Okay. You will see, I think --
MR. GROSSMAN: -- gauge the weight to give to the answer.
THE WITNESS: So here's what I'd say. So I don't know which of those two is right, right, but what I would expect to see is maybe a bit of a sensitivity analysis to see just how much are things changing as you kind of change your model assumptions, which speaks to kind of the introduction we had earlier today, that these models are all

subject to kind of variability, depending on assumptions; and, unless you take this distributional approach -- it's not like one number is right and one number is wrong. The question is, which number is closer to reality, and that, we don't know because we can't put any kind of uncertainty estimate on that, remember, when we just kind of keep running the models or changing one thing and getting a different answer.
BY MS. CORDRY:
Q Okay. In any case, if you're going to look at Mr. Sullivan's urban analysis using these original modeling factors but the corrected background, which -- do you have any opinion as to which would be the more accurate result?
MR. GROSSMAN: Well, which -- no, I don't understand that one. Which what would be the appropriate --
MS. CORDRY: Okay.
MR. GROSSMAN: -- or accurate result?
MS. CORDRY: All right. Let me ask -- let me put it a different way.
BY MS. CORDRY:
Q Were you able to look at an urban analysis from Mr. Sullivan using the same input factors that he did in November but with the corrected background? Were you able to look at something similar to this but with the urban analysis?

A No, I --
MR. GROSSMAN: Aren't you assuming, were you able to, or did he look at it?
MS. CORDRY: No, I'm going to ask him, were you able to?
THE WITNESS: No.
BY MS. CORDRY:
Q And why not?
A I don't know.
Q To your knowledge, was one like that ever produced?
A I don't believe it was.
Q Okay. So if someone says I should use a different analysis but they don't give you a comparable set of data, what does that say to you --
A Well --
Q -- as a scientist trying to review the study?
A -- it creates difficulty kind of now, kind of reviewing it, because the assumptions in the model are kind of moving as we're trying to evaluate kind of the outputs. And so, you know, like I said before, it's not like one is wrong and the other is right, but it creates uncertainty and it's hard to kind of evaluate in that case.
Q And is it more difficult to evaluate if you don't have the other modeling done?

A Well, you have to do what we just did. We're sitting here, trying to evaluate this, the one model, where we're trying to do the math and add kind of stuff to it off the top of our head rather than kind of running the model kind of directly.
Q And if you were going to try to compare, for instance, under the original assumptions --
MR. GROSSMAN: But I think you've made your point here. You --
MS. CORDRY: Well --
MR. GROSSMAN: -- don't have to keep on asking the same question --
MS. CORDRY: Okay.
MR. GROSSMAN: -- three different ways.
MS. CORDRY: Okay. All right.
BY MS. CORDRY:
Q Now, all right, so then you are aware that after seeing the results of the corrected background calculations, which would be this Figure 1, are you aware that Mr. Sullivan revised a number of his modeling inputs?
A Yes.
Q Okay. And do you know why he did that?
A I think the attempt was to become more realistic, I believe. I don't remember the exact wording.
Q I'll quote from his August report at page 17 where

he said he had to, quote, reduce some of the conservatism in the analysis in order to ensure that it has not inappropriately concluded that elevated one-hour NO2 exposures will occur, when, in reality, actual exposure will be far below the standards.

In terms of if you were peer-reviewing a study and you found an error like this and that was the response somebody gave you, what's your reaction to that?

A Well, I think it's clear what, what I've said before about kind of what I would expect to see if this were certainly a paper or something up for publication. Doing these single-point estimates with kind of changing assumptions one at a time doesn't help you too much. It doesn't get you closer to the, to kind of the truth, in my opinion.

Q Is there evidence in the case that you're aware of that would suggest that the assumptions were not, the original assumptions were not overly conservative?

A You know, when I first read the first report, I took Mr. Sullivan's word that they were kind of conservative assumptions, and I'm not quite sure what changed after that, but some of those assumptions clearly did change. But this, this again speaks to, if I could just -- I don't know if you want to keep beating this, but conservatism is in the eye of the beholder, right, and that's, that's the problem with

running the models like this, is we don't know -- if I were running this from scratch, would I pick the same conservatism, would another modeler pick the same conservatism? Maybe, maybe not.

Q Are you aware of some of the concerns that Dr. Cole has raised about the assumptions?

A Yes.

Q Okay. And what would those do in terms of the way the model would come out if his assumptions were --

A Well, he would --

MR. GOECKE: Objection. Foundation and --

MR. GROSSMAN: Yes. I mean, first of all, the witness has answered at least four or five times that he would approach modeling by -- instead of changing the assumptions, he would have done multiple data inputs and run it numerous times to get a series of results --

MS. CORDRY: Right. But --

MR. GROSSMAN: -- that could be compared. So I don't think you have to keep on harping on it over and over and over again.

MS. CORDRY: I understand, but I'm trying to get specifically to Dr. Cole's suggested changes in the assumptions and what effect that would have on the models.

MR. GOECKE: Well, Dr. Cole has already testified about that.

MR. GROSSMAN: Well, I think she can ask him about what, if he has an answer for that, what changes from what Dr. Cole said. I don't know. What specifically are you referring to?

MS. CORDRY: Well, among other things, that Dr. Cole said that he thought the MOVES versus the MOBILE6 modeling, that the traffic congestion could be worse, that there was a number of factors --

MR. GROSSMAN: All right. So let's --

MS. CORDRY: Okay.

MR. GROSSMAN: -- let's ask him about each of those so we know what his answer means. Any change in assumption, you're talking about MOVES versus MOBILE6 and so on.

MS. CORDRY: Okay. Well, I was actually just trying to ask more generally, are you -- whether he was aware that Dr. Cole had suggested that there were assumptions that could make the model come out higher, that really --

MR. GROSSMAN: But he doesn't like changing assumptions. He likes doing a different approach entirely --

MS. CORDRY: Well, one of the --

MR. GROSSMAN: -- but he's already answered that.

MS. CORDRY: Well, one of the changes in that is

that there, that there would be assumptions that could be higher, that it's not just a monolithic possibility, that there, that we've had a -- you know, I'm just really trying to set the background: Are you aware that there's been suggestions that would make the numbers higher than Mr. Sullivan has said?

MR. GROSSMAN: Well, all right, try asking the question. I would keep -- I'm trying to get it to be a more specific question than your open-ended one, which keeps on leading back to the same answer --

MS. CORDRY: Okay. Well --

MR. GROSSMAN: -- okay, that we've heard many times. That's all. So if you want to ask something specific about his understanding of what Dr. Cole suggested, then address it to that specific thing so we get a more specific answer rather than just a repetition of the general principle that he's enunciated many times. I know this is not easy to do. So --

MS. CORDRY: I understand. I understand.

MR. GROSSMAN: -- I've done many expert examinations.

MS. CORDRY: I mean, partially is, he is not the meteorologist either. So he is --

MR. GROSSMAN: Right.

MS. CORDRY: -- not really in a position to, you

know, when Dr. Cole testifies, there are a number of changes that could be made that would produce -- those are the changes you've already got. I'm simply saying that are you aware that there, that there are a basis for, a valid basis --

MR. GROSSMAN: Right, but you're maybe trying to get something out of this witness that is not the thing that this witness is here to testify about. That may be --

MS. CORDRY: Okay.

MR. GROSSMAN: -- the problem, but I'm trying to -- I'm just trying to make sure that the answers are specific rather than --

MS. CORDRY: Okay. Okay.

MR. GROSSMAN: -- more general again. That's all.

BY MS. CORDRY:

Q Let me ask you a different question then. These backgrounds -- these charts that have been done using this 28 or 98, as properly calculated, background, if there are reasons to look at the backgrounds in this area and find others that have a higher value of, say, 118 micrograms per meter cubed, what effect would that have on these charts?

A Obviously, the model values would go higher --

Q Okay.

A -- right? So it's -- and output is sensitive to a variety of inputs, including the background that you choose.

A lower background is going to produce lower numbers. A higher background is going to produce higher numbers.

Q So if you added another 20 micrograms per meter cubed onto these results --

MR. GROSSMAN: He's already answered that.

MS. CORDRY: Okay.

MR. GROSSMAN: If you increase it, the output will be different.

BY MS. CORDRY:

Q All right. Let me turn, ask you to turn back to what's labeled as page 24 in this document.

MR. GROSSMAN: Which document?

MS. CORDRY: In the excerpts from Exhibit 255.

MR. GROSSMAN: Okay. That's the August 2013 report.

MS. CORDRY: Right.

BY MS. CORDRY:

Q And these are ones where the inputs were then changed. They were refined assumptions, according to Mr. Sullivan's testimony, and the background level was reduced from 98 to 90. So we have these two new charts that are done here, one using the urban dispersion and one using the rural dispersion. And if you look at the first, at Figure 10 there, can you describe a little bit about that in terms of the levels that are seen and how far out they go

and where there are levels that are, relate to the EPA rule standard levels.

A So it suggests, again, that there's a hot spot, right, where the service station sits at the center, where it's 200 micrograms/cubic meter, and that concentrations upwards to 170 to 160 micrograms per cubic meter kind of extends into the neighborhood. It's hard to say, kind of, what the impacts in the pool are going to be and the school are going to be because this is a more limited analysis, but if we're concerned about protecting the neighborhood in general, these results suggest that concentrations certainly in the, in the homes, near the homes of the people in this area or within the area, that we'd see excess respiratory disease based on the studies that the EPA cited.

Q Okay. Can you tell from this figure what the roadway levels will be anymore?

A No.

Q Okay. And that's because they're not showing the roadways?

A Correct.

Q Okay. So we can't take that into effect. Okay. And for Figure 9, which is this urban dispersion?

MR. GROSSMAN: I just want to make sure I understand in terms of -- you're looking at Figures 9 and 10 now --

MS. CORDRY: Yes.

THE WITNESS: Uh-huh.

MR. GROSSMAN: -- on Exhibit 255? And what number are you referring to that suggests to you that the exposure in the residences would be problematic?

THE WITNESS: So if we -- so we see the 160 line in the neighborhood in Figure 10.

MR. GROSSMAN: Oh, I see. Okay, in Figure 10, 160.

THE WITNESS: Right. And then I'm assuming the next one is 150, right?

MR. GROSSMAN: Okay.

THE WITNESS: And so 150 micrograms per cubic meter is 80 parts per billion.

MR. GROSSMAN: Okay.

THE WITNESS: And so these are values that are in the range that the EPA administrator thinks are problematic in terms of disease risk.

MR. GROSSMAN: Okay. That's right at the edge, if I understand it.

THE WITNESS: Well --

MR. GROSSMAN: It was 50 to 80, right?

THE WITNESS: Yeah.

MR. GROSSMAN: Okay.

THE WITNESS: Remember, they're reevaluating --

MR. GROSSMAN: Right.
THE WITNESS: -- as well, and everybody, you know, we can't bank on it, but there's been a lot of science since then.
MR. GROSSMAN: Yes, but once again, as you suggested, there is a point at which you have to say I'm going to rely on what's, what's, the agencies that determine the standards have now. And I understand, you know, what the testimony has been about those standards, but it's a little bit different to suggest that I have to go, I have to assess this based on material that hasn't yet been accepted for standard establishment by the EPA. So that's a distinction, but go ahead.
MS. CORDRY: Well, that is a question that you're going to have to answer, and I think our --
MR. GROSSMAN: Right.
MS. CORDRY: -- position is going to be that --
MR. GROSSMAN: I understand.
MS. CORDRY: -- those are issues to look at.
MR. GROSSMAN: I understand.
MS. CORDRY: Okay. So --
MR. GROSSMAN: The reason I asked my question, by the way, is I was looking at Figure 9 --
MS. CORDRY: Right.
MR. GROSSMAN: -- and I saw that the isopleth in

the neighborhood was at 110 micrograms per cubic meter and, when I did the math, that was lower --
THE WITNESS: True.
MR. GROSSMAN: -- well below the 80. So that's why I wondered what you were referring to. I hadn't seen the one down in Figure 10.
BY MS. CORDRY:
Q But the 110, which would translate, if I'm looking at my little cheat sheet here, to about 58 parts per billion, that is still in that range of 50 to 75 that they were trying to keep the rates at or below if you kept the roadway levels, is that correct?
A Yes.
MR. GROSSMAN: Yes, but 50 to 75 was at or below. So that's why -- I wouldn't --
MS. CORDRY: Right.
MR. GROSSMAN: -- say that that's necessarily problematic, but okay.
MS. CORDRY: It's based on the evidence that they had in mid-2008.
MR. GROSSMAN: Once again --
MS. CORDRY: Okay. Which we will be going beyond shortly.
BY MS. CORDRY:
Q All right. Now, I think you had mention that

there was a limited number of monitors out there for NO2. Are you aware as to any changes that were going to be made in those monitoring as part of the NO2 rule?
A In terms of more monitoring closer to roadways?
Q Yes. Yes, that there, are you aware that there's going to be a -- that there is a requirement in the rule for additional monitors --
A Yes.
Q -- near roads? Okay. And what effect would you expect that to have on background-level readings?
A Well, the background readings are going to change, and I expect, you know, the background is going to be higher if you incorporate near-roadway measures into that. And it comes to the point, well, what are you considering background, but certainly, we're going to see higher levels, in general, when EPA starts monitoring more frequently closer to bigger roadways.
Q And another from Dr. Cole, he did suggest one way to look at perhaps the most accurate number was to take Mr. Sullivan's original approach, which was to roughly average the urban and rural numbers, and in his testimony, when he took that 168 max from Figure 9 and the 217 max from Figure 10, he came out with a level of approximately 190. And, again, how do you react to that number in terms of --
A I'm sorry.

Q Okay.
MR. GOECKE: Objection. Are you saying Dr. Cole said you should average them or Mr. Sullivan?
MS. CORDRY: Dr. Cole quoted from Mr. Sullivan's report, which said the most accurate number was somewhere between the urban and the rural number. That was his original position, was that the most accurate way to deal with this area was to take a position between the two numbers. And Dr. Cole then did that calculation and essentially averaged these two numbers and came out with a value of roughly 190.
MR. GOECKE: Okay. Well, the record will speak for itself, but I just want to object to the extent that she's making assumptions about what's in the record and not showing us those points of the record.
MR. GROSSMAN: You're talking about in that affidavit that Dr. Cole did?
MS. CORDRY: In the affidavit, then in his testimony, both --
MR. GROSSMAN: Right.
MS. CORDRY: -- and certainly the point about -- I can find the quote from Mr. Sullivan about how you should combine the two, like, if --
MR. GROSSMAN: Right. Okay. Subject to that qualification in your objection, we'll go ahead and let you

ask that question.
MR. GOECKE: Thank you.
BY MS. CORDRY:
Q So, again, if that would be one way of determining the most appropriate number, the most accurate number, would be the average of the two would be 190, again, can you just comment on that in terms of the health effect concerns?
A You know, I don't think I can comment on it. First of all, accuracy in this case is something we don't know. Right? There's a statistical meaning to accuracy that, again, means kind of just how close to the truth is it. We can talk about, you know, how appropriate it is to use one or the other, we can see how the thing is going to change when we do that, but the reality is probably somewhere in between, and the question is, do we pick one or not or -- I again go back to my premise that this one-assumption-at-a-time kind of approach --
Q Actually --
A -- doesn't get us where we want to be.
Q -- my question was a little simpler. If you picked -- if you say, whether it's a good approach or not, but if you say the number is 190, is that a problem in terms of health effects, if the maximum point at this area back here is 190, let's hypothesize that, whether it's based on Dr. Cole's testimony or anything else?

A Well, clearly, you know, it would be a problem.
Q Okay. All right. And then one last question here. At one point in his cross-examination, Dr. Chase was asked whether a level of 277 micrograms per meter cubed that Dr. Cole had, again, had estimated as one of the potentials for the highest point on the, I'm sorry, excuse me, he had estimated in his affidavit might be the highest point using the, this rural modeling but with the new inputs, Dr. Chase was asked whether a level of 277 micrograms per meter cubed, whether that could cause, whether he'd have concerns about that as causing health effects, and his answer was basically that it would depend on whether there was a sufficient --
MR. GOECKE: Objection. If we're going to quote him or cite something, let's quote him, not say basically what he said.
MS. CORDRY: I can find the exact quote, but --
MR. GOECKE: Okay.
MR. GROSSMAN: Let's let her finish asking the question anyway.
BY MS. CORDRY:
Q The question is basically that it might or might not, depending on whether there were sufficient margins of safety in the EPA rule. Do you agree with the conclusion that there is, that the level of 277 is a debatable level?
MR. GROSSMAN: I think it's fair, the point that

Mr. Goecke made is fair. Why don't we get the specific statement that was made --
MS. CORDRY: All right.
MR. GROSSMAN: -- if you're going to quote him.
MS. CORDRY: All right.
BY MS. CORDRY:
Q And let me ask you just a different way. Would you agree that there's any question that -- let me put it differently. Would you view the level of 277 micrograms per meter cubed as a debatable question in terms of health?
MR. GROSSMAN: Well, first of all, of what? Two hundred seventy-seven --
MS. CORDRY: Micrograms per meter cubed.
MR. GROSSMAN: Of?
MR. SILVERMAN: NO2.
MS. CORDRY: Of NO2 --
MR. GROSSMAN: Okay.
MS. CORDRY: -- as being a debatable level of risk for health effects.
MR. GROSSMAN: On a one-hour --
MS. CORDRY: On a one-hour standard --
MR. GROSSMAN: Okay. Just --
MS. CORDRY: -- the one we've been doing all the way through here, yes, right.
THE WITNESS: I think that's well in excess of

what I would think is an acceptable level exposure. We saw asthmatic increases in symptoms of kids with asthma in our studies in homes with exposures, you know, 30, 40 parts per billion, which is 50 micrograms/cubic meter, so a quarter, a fifth of that.
MS. CORDRY: Okay. This might be a good place to take a break --
MR. GROSSMAN: All right.
MS. CORDRY: -- before we get -- if you're going to use the cafeteria.
MR. GROSSMAN: You can tell that Mr. Silverman was getting hungry.
MS. CORDRY: Yes.
MR. SILVERMAN: I was, yes.
MR. GROSSMAN: All right. About how much --
MS. CORDRY: I think --
MR. GROSSMAN: -- more examination?
MS. CORDRY: I am more than halfway through. I think, hopefully, it'll go relatively fast because some of these things I think he has talked about somewhat before. If we could take a slightly shorter break, because he really would like to get out of here before the end of the day. So --
MR. GROSSMAN: Well, I want to make sure that people have time to get a bite.

MS. CORDRY: Yes.
MR. GROSSMAN: Do you want to come back at 2 o'clock? It's 1:30 now.
MS. ADELMAN: Wow.
MR. GROSSMAN: You said a slightly shorter break.
MS. CORDRY: Yes.
MR. GROSSMAN: We usually try to do 45 minutes, but --
MS. CORDRY: Let's say 2:10.
MR. GROSSMAN: 2:10?
MS. CORDRY: Yes.
MR. GROSSMAN: Okay. All right. We'll break for lunch until 2:10.
(Whereupon, at 1:27 p.m., a luncheon recess was taken.)
MR. GROSSMAN: All right. Ms. Cordry, the ball is in your court.
MS. CORDRY: All right.
BY MS. CORDRY:
Q So up until now we've been talking about the EPA's NO2 standard as it was announced in December 2010. Are you aware of whether that standard is being reviewed again?
A Yes. It's being -- it's under review now.
Q Okay. And in what stage is it at, to your knowledge?

A They're doing the review of the literature, assessing all the studies and trying to come up with a composite review document.
Q Okay. In looking at these studies, the last one or this one, any of them, what effect does this fact that pollution is often a mixture of chemicals, how does that play into what they have to do in terms of setting their levels for each individual pollutant?
A Right. So it creates, it creates this problem, right, because oftentimes there are studies that identify the mixture but can't tease out the individual pollutant really well and they'll see health effects in the mixture, that the combined -- the individual levels of the two pollutants are both below their perspective standards, but the EPA administrator has a hard time using those for setting individual standards. Right?
So that the challenge now is, from a public health perspective, is, where is the threshold? And the health threshold was clearly below those levels, but you know, is it PM by itself, is it NO2 by itself, is it combined PM and NO2 by itself, and that's the challenge. And oftentimes the administrator will look at studies and say the -- suggest there's a health risk at NO2 below the level that we think the standard should be but we can't use this study because it can't say how much of that excess versus exactly due to

SO2 -- NO2 versus PM. So that's a big challenge.
Q Okay. And do they refer to that in the rules?
A Well, they address on that. So they'll mention studies in their review that say this study suggests there's a health effect at some level below that we currently have a standard, but we can't use this in our standard setting rule-making because we're, we're handcuffed, if you will, by looking at things one at a time.
Q Okay. And does that apply to both the NO2 and the PM2.5 standards?
A Yeah, that does, right.
Q And talking about the Southern California study that you had mentioned before, does that relate to this problem you just mentioned?
A Yes, it does. That's a perfect example.
Q Okay.
MS. CORDRY: Let me hand out, if you would, let me just go ahead and give out three right now so we can discuss these -- this one, this one, and this one. All right.
MR. GROSSMAN: Thank you.
MS. CORDRY: If we can mark these as exhibits and have them --
MR. GROSSMAN: Okay.
MS. CORDRY: I guess the other ones were previous exhibits. We didn't -- those were not new pieces. So --

MR. GROSSMAN: Well, some. We have, we marked your résumé --
MS. CORDRY: Right. Right.
MR. GROSSMAN: -- as 438, and 439(a) and (b), your conversion package. The others were just parts of previously --
MS. CORDRY: Right, but we didn't have to mark these, for instance, because they were already in, right. Okay. So these would be new exhibits to mark.
MR. GROSSMAN: So --
MS. CORDRY: The first one is --
MR. GROSSMAN: -- first one?
MS. CORDRY: -- about six or seven pages from the 2008 Integrated Science Assessment. So this is the one that the EPA has acted on already.
MR. GROSSMAN: All right. So this is Exhibit 440, and this is pages --
MS. CORDRY: 3-56 through 3-62.
MR. GROSSMAN: Okay. Pages 3-56 to 3-62, did you say?
MS. CORDRY: Right.
MR. GROSSMAN: 62, from -- this is an EPA publication?
MS. CORDRY: Yes.
MR. GROSSMAN: EPA --

MS. CORDRY: Well, it's called their Integrated Science Assessment.
MR. GROSSMAN: -- Integrated Science Assessment. Dated what?
MS. CORDRY: It was done in mid-2008. I'll have to find you the exact date.
MR. GROSSMAN: Okay, 2008. Does it have any subtitle to it or this is just it? This is just pages from that overall thing?
MS. CORDRY: Yes, it's just pages from the overall document.
MR. GROSSMAN: Okay. Okay. So 440 is marked.
(Exhibit No. 440 was marked for identification.)
MS. CORDRY: Oh, I'm sorry. I'm sorry. And then the next one would be a, this is an -- we're going to discuss a study in here, and this is an article that discusses the study. That would be 441, and --
MR. GROSSMAN: Which one is that?
MS. CORDRY: That's this one, the article.
MR. GROSSMAN: Okay. So Pollution Damages Lung Development?
MS. CORDRY: Right.
MR. GROSSMAN: All right. That's Exhibit 441 and that's -- this is written by Dr. Breysse?

MS. CORDRY: He is quoted in there --
MR. GROSSMAN: I see.
MS. CORDRY: -- and it describes the study, and he's quoted in that article.
MR. GROSSMAN: I see. Okay. So article: Pollution Damages --
MS. CORDRY: Okay.
MR. GROSSMAN: -- Lung Development, and who -- where does this appear?
MS. CORDRY: This particular article appears in the Environmental Health Perspectives journal at the bottom.
THE WITNESS: I think he's talking about --
MS. CORDRY: Oh, I'm sorry --
MR. GROSSMAN: No.
MS. CORDRY: -- the particular article itself was a, it's a --
MR. GROSSMAN: A CBS News?
MS. CORDRY: Cbsnews.com, yes.
MR. GROSSMAN: Article. All right. So CBS News article. All right. And let's see. The date on that was --
MS. CORDRY: September 9th, 2004.
MR. GROSSMAN: Okay. 9/9/04. And Exhibit 442?
(Exhibit No. 441 was marked for identification.)

MS. CORDRY: Is another study. That particular one is dated July 2010.
MR. GROSSMAN: Okay. July 2010 study from -- so that's a study of Childhood --
MS. CORDRY: Incident Asthma and Traffic-Related Air Pollution.
MR. GROSSMAN: -- Incident Asthma and Traffic-Related Air Pollution at Home and at School.
(Exhibit No. 442 was marked for identification.)
MS. CORDRY: Right.
MR. GOECKE: And I'm sorry. That's 442?
MS. CORDRY: Yes, that would be 442.
MR. GROSSMAN: Yes, it's 442.
MS. CORDRY: And I did look up -- that EPA Integrated Science Assessment was done in July of 2008.
MR. GROSSMAN: Okay. Okay. We're set to go.
BY MS. CORDRY:
Q So the Southern California studies, can you just give a brief idea of what the overall study pattern was that was going on, what was being done in these studies?
MR. GROSSMAN: That's Exhibit 440?
MS. CORDRY: Yes.
MR. GROSSMAN: Okay.
THE WITNESS: Well, Southern California had a

grant from the EPA and the NIHS as part of a Children's Study -- Children's Environmental Health Research Center, and as part of that, they established a number of cohort studies of kids. And the whole purpose of their center was to evaluate the impact of air pollution on asthma and respiratory health in children.
MR. GROSSMAN: Oh, well, that's Exhibit 442.
MS. CORDRY: There's a number of studies, and they've done a number of different studies. This particular one --
MR. GROSSMAN: What are we talking about now?
MS. CORDRY: Okay. In -- well, right now I'm talking, in general, there's a whole pattern of studies that was done by this group.
MR. GROSSMAN: Okay.
MS. CORDRY: We're going to discuss some of them that are referred to in 240, I mean, in 440, and then a later one is 442.
MR. GROSSMAN: Okay.
MS. CORDRY: So I'm just, in general, the study, okay, was --
BY MS. CORDRY:
Q And was it being done in one area, more than one area?
A Well, across Southern California.

Q Okay. So a number of different communities in Southern California?
A Yes.
Q Okay. So if we look back at page 3-59, is that chart taken from one of those studies?
A Yes.
Q Okay. And it's got Source: Derived from Gauderman et al. (2004) --
A Yeah.
Q -- at the bottom there on the right-hand side? And if you look back on the first page of this, page 3-56, it talks about -- the last paragraph there talks about: In 2004, Gauderman et al. reported results, and so forth?
A Correct.
Q So that's the discussion of that page of that chart? Okay.
A Yes, ma'am.
Q And if you look at that, what are these, what does this -- what are these charts showing to you?
A So it suggests there's a host of pollutants that are impacting the lung development in children. Right? So there's an exposure-response relationship for both PM and NO2, for example. So that as exposure goes up, the fraction of kids who have, you know, 80 percent of predicted values, so the fraction of those kids that are less than that -- and

80 percent is a value typically used as normal -- so the fraction of kids that are abnormal goes up as the air pollution exposure goes up.
Q And what is FEV?
MR. GROSSMAN: I don't quite understand. What's on the vertical axis here, first?
THE WITNESS: So if we pick the second, on the left-hand side, the second panel down.
MR. GROSSMAN: Okay.
THE WITNESS: So this is kids who have -- a proportion of 18 years old with FEV1 below 80 percent. So --
MR. GROSSMAN: FEV1 stands for?
THE WITNESS: Right. So that's fixed expiratory volume. So what that means is they have -- if you're normal, you would have a volume of 100 percent. Right? So --
MR. GROSSMAN: Okay.
THE WITNESS: -- you blow into a machine, they measure your lung capacity, and if you're normal, you have what's 80 to 100 percent of what's expected for your age.
MR. GROSSMAN: All right.
THE WITNESS: Okay? So --
MR. GROSSMAN: And that's called FEV1?
THE WITNESS: Right.

MR. GROSSMAN: Okay.
THE WITNESS: Okay. And so this is that lung development study I showed you before. So notice that the percentage of kids who have abnormal lung development/lung function goes up as the pollution levels go up. So this was the study I talked about before that was remarkable, that really got a lot of people's attention.
BY MS. CORDRY:
Q Right. So, again, the left-hand axis that he was asking about, that's the percentage of kids who have this abnormal level. So --
A Right.
Q -- zero at the bottom up to 10 percent?
A Right. So if you're less than 80 percent, it's not good.
Q Okay. So, and what one would expect to be in a hypothesis like this, the lowest level of abnormal kids is at the lowest point of NO2 exposure, is that correct? In other words, the zero to two level is down there where the NO2 is between zero and 10.
A Well, it goes up as you move from the low exposures --
Q Right.
A -- right, up.
Q Right.

MR. GROSSMAN: What exactly is going up? That's what I don't --
THE WITNESS: That's the fraction of kids who have poor lung function.
MR. GROSSMAN: I see. So the bottom -- what is the horizontal axis here? It says 25 to 40. What does that mean?
THE WITNESS: I'm not sure what that 25 is, but that's the NO2 concentration going up from 10 to 20 to 30 to 40.
MR. GROSSMAN: So that's the NO2 --
THE WITNESS: That's increasing pollution concentration. So as their estimate of the pollution concentration went up in these kids, their lung function -- a fraction of kids who had bad lung function went up.
MR. GROSSMAN: Oh, I see. So that 25, that's strange what that --
MS. CORDRY: Yes. I think that's a, it looks -- it just looks like a misprint or something. I'm not sure. It looks like it was carried down from the one above there. See where it had --
MR. GROSSMAN: Yes, but the one above it also. Are you saying the one above it? Doesn't that start at zero?
MS. CORDRY: Right. Well, that one is saying --

these ones were looking at certain values there, and within the value range that they had, they looked at these levels. So for ozone it doesn't look like there was much effect. Ozone does not seem to be having a correlation here, but NO2 and PM2.5 and PM10 and acid vapor and elemental carbon, all of these other different things do appear to have a cause-effect, dose-effect relationships.

MR. GROSSMAN: Okay. So if I'm reading this chart correctly, that second one down on the left --

MS. CORDRY: Yes.

MR. GROSSMAN: -- if you have NO2 concentrations even as low as five --

MS. CORDRY: Right.

MR. GROSSMAN: -- parts per billion, you start to see some effect, and then that increases as you go up to 40 parts per billion. Is that correct?

THE WITNESS: Correct.

MS. CORDRY: Right.

MR. GROSSMAN: Okay. What does the R equals .75 and the P equals .005 mean?

THE WITNESS: So the R is a measure of how well one is correlated with the other. It's a statistical term --

MR. GROSSMAN: Okay.

THE WITNESS: -- the higher, the better. And the

P value means it's significant. So that means there's a statistically significant. So if we look at the one above it, the R value is .04, which means they're not really related to one another; as one goes up, the other doesn't go up --

MR. GROSSMAN: Right.

THE WITNESS: -- and it's not significant. So you see the P value as .89. Right? So we look for a P value that's less than .05.

MR. GROSSMAN: Right, but I -- oh, I was just seeing that it was .005. So that's --

THE WITNESS: Right. So that's even, that's even better than .05, right.

MR. GROSSMAN: Okay.

MS. CORDRY: That's really, really significant.

MR. GROSSMAN: Thank you --

MS. CORDRY: It's got an extra zero in it.

MR. GROSSMAN: -- but you're not the witness. All right. All right. I'm sorry to ask you this a second time, if not a third time, what do the words FEV stand for again?

THE WITNESS: So forced expiratory volume.

MR. GROSSMAN: Forced?

THE WITNESS: In one --

MR. GROSSMAN: Right.

THE WITNESS: -- second.

MR. GROSSMAN: I remember. So expiratory volume.

BY MS. CORDRY:

Q And, again, looking at the PM2.5 chart, which is the one next to that on the same line?

A We see a similar relationship, and I think herein lies the conundrum, because we also know that NO2 and PM2.5 are correlated with one another, and so the question becomes, you know, what's driving the risk here? And you'll see that the administrator, in fact, goes on to say, if you look on the top of page 3-57, that these results are, the authors, the authors concluded the effects of NO2 could not be distinguished from the effects of particulate matter as NO2 was strongly correlated with particulate matter contaminants. So we see a risk with this mix of traffic-related pollutants, but it's hard to say just how much is due to one versus the other.

BY MS. CORDRY:

Q And on page 3-60, at the bottom there, is there a reference to another study by this group?

A Yes.

Q Okay. And, again, if you read the last sentence there, going over to the next page?

A Thus, while the study presents important findings with respect to traffic pollution and respiratory health in children, it did not provide evidence that NO2 was

responsible for these effects -- these deficits in lung function.

Q And actually, if you read actually the sentence before that, which is explaining really why, I think, it's having this problem with sorting this out.

A Yeah. So this study did not attempt to measure specific pollutants near freeways or to estimate exposure to specific pollutants for study subjects.

Q Instead, what was this particular study doing? What was it --

A So they have a combined kind of traffic-related pollutant kind of exposure measure. So this is, this is the challenge today, and I think this is in part the challenge, Mr. Chairman, that you have to kind of sort out, is they're both there and they're -- you can't, you can't think exclusively about one being there by itself and that's the reality, and unfortunately, the EPA doesn't know how to grapple with that just yet, but hopefully that'll be coming down the road soon.

MR. GROSSMAN: Well, if they don't know, I certainly won't. I don't have to grapple with it because there's no words for me to determine that.

MS. CORDRY: Well, except that you are not setting an EPA standard on a pollutant-by-pollutant basis. You are looking at the effect of the global effects of this station.

That is in fact what the special exception standard is.
MR. GROSSMAN: But I'm not going to create my own separate standard. I've told you that. I don't think that that, it's not --
MS. CORDRY: I understand, but if there --
MR. GROSSMAN: -- it is unwise for a land use Hearing Examiner to create a separate air pollution standard.
MS. CORDRY: But if there is no EPA standard that deals with traffic-combined pollution -- and that is in fact the issue to be determined here: what is the effect of the traffic, the global traffic pollution from this station -- your question that you're going to have to grapple with a little more is what do you do if there is in fact no EPA standard that governs the issue that you have to decide, and that's what we're trying to give you evidence on. Where is the evidence here, and if you cannot come up with a standard on that, does that not weigh against the applicant, not the objecting parties?
MR. GROSSMAN: I fear that you are asking me to create a scenario that is impossible for any of the parties that are regulated to ever meet. So that's, that's the problem with -- there has to be some level of predictability in a standard that's set up, and you're asking me to evaluate all the science and create my own standard that the

EPA hasn't even been able to come up with yet. That's not --
MS. CORDRY: But if --
MR. GROSSMAN: -- that would not be an appropriate function for me.
MS. CORDRY: We will do this more in the argument, but --
MR. GROSSMAN: Yes.
MS. CORDRY: -- if the EPA was regulating X and you're job is to evaluate Y -- I understand, it is certainly much simpler if there was an EPA standard for it -- but we are going to continue to ask you to evaluate what the special exception standard is, is whether the gas station, taken as a whole, with the mixture of traffic-related pollutants that it creates, can cause harm. And if you can't say that you know the answer to that one way or the other, we believe that the answer under the special exception is --
MR. GROSSMAN: That I reject all gas stations.
MS. CORDRY: No, but you certainly reject a gas station that inherently is far outside the norm of all gas stations.
MR. GROSSMAN: The logical extension of your argument is a rejection of everything --
MS. CORDRY: No.

MR. GROSSMAN: -- that's the problem.
MR. SILVERMAN: No.
MR. GROSSMAN: I understand your point. I understand your point, but that's what I fear is the logical extension of what you want me to do, and I think it would be unwise for me to do the extrapolation that you want me to do.
MS. CORDRY: But, okay, one point -- was trying to ask him about the thresholds and so forth -- is, there is a difference between is it inherent in a small neighborhood gas station to have some level of pollutants that we may have to accept, is that inherent in this gas station. Clearly this gas station is not at the same level. So it goes to the question of non-inherent effects.
MR. GROSSMAN: I don't think it's disputed that there are non-inherent effects from -- their own witnesses testified that there are non-inherent effects from this gas station.
MS. CORDRY: All right. And then I have to show you there are adverse effects, which is what we're trying to do, and if we just say --
MR. GROSSMAN: Right.
MS. CORDRY: -- we cannot say anything is adverse unless the EPA has already ruled it's adverse, then we might as well go home.

MR. GROSSMAN: No.
MS. CORDRY: But --
MR. GROSSMAN: Well, I haven't gone that far.
MS. CORDRY: Okay.
MR. GROSSMAN: That's a little different from --
MS. CORDRY: All right.
MR. GROSSMAN: -- what you're saying.
MS. CORDRY: Which is --
MR. GROSSMAN: I think you want me to -- I think that part of the thrust of what you said is to ask me to create a standard that the experts who, generally speaking, govern these standards haven't yet come up with, and I'm unwilling to march into that territory because I think it is not within my jurisdiction, nor is it wise to do it. So that's part of what you're asking me. There is another part of what you're asking me, and I understand that. I understand your argument, and I think you understand what I'm saying; so let's not argue it now.
MS. CORDRY: Right. Well, we will put this in and then that will --
MR. GROSSMAN: Right.
MS. CORDRY: -- leave us to go from what the legal effect of that is --
MR. GROSSMAN: All right.
MS. CORDRY: -- because we do need to put this

evidence in the record regardless. Okay.
MR. GROSSMAN: Yes.
BY MS. CORDRY:
Q All right. And, again, if you look now at Exhibit 442. Was this also from the same group?
A Yeah.
Q Yes. Okay. And in terms of all three of these -- well, let me stick with the 2004 study, which is the one that had the PM2 levels and the NO2 levels, and this 2010 study as well. In terms of looking at the absolute levels of pollution that were dealt with in here, how did those, how did those levels relate to the levels that we're seeing in Mr. Sullivan's analysis?
A So they're below those levels.
Q Okay. And let me say, can you say specifically what kind of levels we're talking about for these that are being looked at here, where effects are being found on health?
MR. GROSSMAN: By here, you're talking about --
MS. CORDRY: In the studies.
MR. GROSSMAN: -- this article on Childhood Incident Asthma and Traffic-Related --
MS. CORDRY: Yes.
MR. GROSSMAN: -- Air Pollution? And you're saying that the levels that were studied in this study were

lower than those that are reflected in the Sullivan study; is that what you're saying?
MR. SILVERMAN: Yes.
MS. CORDRY: Yes, in terms of the levels.
BY MS. CORDRY:
Q And let me ask you, these studies are ones with essentially long-term pollution levels, is that correct?
A Correct. Correct.
Q All right. So in terms of looking at that, because we mostly, until this point, have been talking about the short term, the one-hour piece --
MR. GROSSMAN: Right.
BY MS. CORDRY:
Q -- in the same exhibit, 255, the set of charts, if you turn to the second page there, the one that's labeled Figure 2 --
A Okay. What page?
MR. GROSSMAN: Page 12, Figure 2.
BY MS. CORDRY:
Q This is one that was done in, I'm sorry, in August of this year with the corrected background level. It had to be recalculated for both the annual and the one-hour standard. So this was done with the corrected levels here, and what levels do we see marked on this particular chart?
A A particular area or --

Q In general. What's the range covered in the chart?
A It's a black background; it's hard to read. Looks like the maximum is 46 micrograms/cubic meter and out into the neighborhood it gets down to 28 micrograms/cubic meter.
Q Okay. And actually, if I look out again on Georgia Avenue there, it looks like I'm actually seeing some numbers above 46. Do you see that?
A Yes.
Q So I think we gathered that the 46 must be the determination of what's the max just at the station itself. Okay. All right.
MS. CORDRY: Now, if we look back at our little cheat sheet that I did, one of the things I wanted to do here was to try to make it easy to compare these microgram numbers with the parts per billion that show up in most of the studies. So the one, if we go to the bottom set of figures there, there's four, four lines at the bottom.
MR. GROSSMAN: Which page are you on?
MS. CORDRY: This would be 439(b).
MR. GROSSMAN: Okay.
MS. CORDRY: And you see the four lines at the bottom?
MR. GROSSMAN: Yes.
MS. CORDRY: The top one of that four is labeled

August 2012, Figure 2.
MR. GROSSMAN: Yes.
MS. CORDRY: So if we go across there, the 28 to 45 -- and 45 is the --
MR. GROSSMAN: This should be August 2013, shouldn't it?
MS. CORDRY: I'm sorry, yes, August 2013. This should all be August 2013, sorry.
MR. GROSSMAN: Okay. Thank you.
MS. CORDRY: In any case, with the range of 28 to 45 that's shown on the isopleth lines, I just converted that into parts per billion, so roughly 15 to 24 parts per billion --
MR. GROSSMAN: Okay.
MS. CORDRY: -- 14.9 to 23.9, and then the 46 max is 24.5.
MR. GROSSMAN: Okay.
BY MS. CORDRY:
Q So if this one is showing a range of 15 to 24, how does that compare with the ranges you're seeing --
A It's very comparable. It overlaps. Table 2 in the 2010 publication suggests the pollutant exposures that they saw ranged from 8.7 to 32 parts per billion. So we're looking at exposures that are in the range on an annual average with the levels that are predicted to occur at this

station.
Q Okay. And the same would be true of the study that's in the ISA report, this one where we had the charts?
A Yes. Yeah.
Q Okay.
MR. GROSSMAN: You're saying that's on Table 2 in Exhibit 442?
THE WITNESS: This paper? Mine aren't, mine aren't numbered.
MS. CORDRY: Yes, this one, yes.
MR. GROSSMAN: Yes, that paper. And you're saying that's in Table 2, the comparable number?
THE WITNESS: Right, central site NO2 measurements, the bottom half of Table 2.
MR. GROSSMAN: Bottom half. Oh, I see. Okay. So --
BY MS. CORDRY:
Q Yes. Can you just describe these various column labels where it's Mean, Median, IQR?
A Yeah. So the average was 20.4 parts per billion. The median, which is a value which half are above or below, is --
MR. GROSSMAN: Right.
THE WITNESS: -- is 21.2. Interquartile range is the range from the 25th percentile distribution to the 75th.

That's 12.8, but the numbers I was quoting gives you the minimum, which was 8.7, and the maximum was 32.3.
BY MS. CORDRY:
Q And when you say that 12.8 number, that's saying that from the 25th value up to the 75 value, there's a, there's a range --
A Right.
Q -- of 12.8 micrograms there? Okay. And the total range is that 23.6. That's the difference between the 8.7 and the 32.3, correct?
A Correct.
Q Okay. All right.
A But the strength of this paper was coming up with that combined traffic-related kind of exposure index. That was the big contribution of this paper, the TRP.
MS. CORDRY: The next one I'd like to introduce would be this one here. That would be 443.
MR. GROSSMAN: Okay.
BY MS. CORDRY:
Q Can you describe what was studied in this paper?
A So this study took advantage of kind of a natural experiment where they --
MR. GROSSMAN: Hold on one second. Let's identify the paper first.
MS. CORDRY: I'm sorry. It's labeled Traffic

Congestion and Infant Health: Evidence from E-ZPass --
MR. GROSSMAN: Okay. So April --
MS. CORDRY: -- done April 2012.
MR. GROSSMAN: -- 2012, Traffic Congestion and Infant Health --
MS. CORDRY: And it's discussing what happened when they put the ubiquitous E-ZPass system in place at toll plazas in New Jersey.
MR. GROSSMAN: Not much on the George Washington Bridge.
MS. CORDRY: Well, for Fort Lincoln or Fort Lee or whatever that was, but yes --
MR. GROSSMAN: Right, Fort Lee.
MS. CORDRY; -- as long as you are not idling at the toll plaza, which E-ZPass --
MR. GROSSMAN: Right. All right. So Traffic Congestion and Infant Health: Evidence from E-ZPass --
MS. CORDRY: Right.
MR. GROSSMAN: -- on April 2012 and that's Exhibit 443. Okay.
(Exhibit No. 443 was marked for identification.
BY MS. CORDRY:
Q Okay. All right. And if you can just briefly discuss what this paper was dealing with and what the

results were that it found.
A So it's just, it's just getting at the same sort of question. So they're able to take advantage of this with or without the E-ZPass and that there was a reduction of pollution around the toll plaza with the introduction of the E-ZPass because cars can now speed through; they didn't have to stop and idle. And they showed that pollution went down, and then more importantly, they also suggested there were these impacts on these birth outcomes, which is relatively novel, in terms of the reduced prematurity and low birth weight among mothers within two kilometers of the toll plaza by 10.8 and 11.8 percent, suggesting that the reduced air pollution kind of improved the birth outcome for the mothers who were pregnant before versus after.
Q And did that give an indication of how much of a decline in NO2 levels resulted in that?
A On page 18 they say the estimates indicate that NO2 fell by about 10.8 percent, but I don't know if they give a total concentration drop.
Q I was not able one to find one in there. They didn't seem to have a lot of actual monitors in the areas, but they were able to apparently evaluate how much dropped. So -- and that 10 percent drop, you're saying then, they correlated with these improved birth results, is that correct?

A Right. So this --
Q Okay.
A -- this is part of the bigger picture again of kind of the traffic-related air pollution being bad for people living close to a lot of it.
MR. GROSSMAN: And they concluded that there was a cause-and-effect relationship just from that --
THE WITNESS: No. I think they say --
MR. GROSSMAN: -- that use of E-ZPass between --
THE WITNESS: -- they said there's an association.
MR. GROSSMAN: Right. A correlation?
THE WITNESS: Yeah.
BY MS. CORDRY:
Q I mean, did they control for other -- I'm sorry.
MR. GROSSMAN: What do they control for? Yes. Where is that?
BY MS. CORDRY:
Q Well, yes. I mean, did they control for other possible things that might have happened before and after the introduction of E-ZPass?
A I cannot recall.
Q I would ask you to look at, let's see -- well, in the first place, look at the, about the third sentence in the abstract on the front page there, third and fourth sentence there.

MR. GROSSMAN: Yes, they are concluding that there's --
MS. CORDRY: Yes.
MR. GROSSMAN: It makes me wonder. So what other factors did they --
MS. CORDRY: Well, let's see if we can find what all else --
MR. GROSSMAN: -- control for?
THE WITNESS: They mentioned housing prices, which would be a control for socioeconomic status.
MS. CORDRY: What are they looking at? They looked at housing data --
THE WITNESS: And the mother's age --
MS. CORDRY: -- they looked at racial composition: did that change from -- I mean, again, because you're doing something that's over a very short period of time: putting in a toll plaza.
MR. GROSSMAN: Yes. What period of time was that that --
MS. CORDRY: Well, they looked at each toll plaza separately. So --
MR. GROSSMAN: Yes.
MS. CORDRY: -- between building a toll plaza, before and after, is presumably -- actually, putting E-ZPass in at a toll plaza is presumably a pretty --

MR. GROSSMAN: Right.
MS. CORDRY: -- short process. So they looked at a period of time before that and a period of time after that.
MR. GROSSMAN: Just that there could be so many other factors --
MS. CORDRY: Right.
MR. GROSSMAN: -- involved in that. That's just --
MS. CORDRY: But if you do that over a number of different toll plazas and you have similar results --
MR. GROSSMAN: Yes, just --
MS. CORDRY: -- and again, they controlled for, as they say, race and income levels and smoking --
THE WITNESS: Mother's age, smoking, yeah.
MS. CORDRY: -- and so forth, and so they controlled for quite a few factors. I mean, I can go through all of those, but the point being that their conclusion was that it really was -- the most logical conclusion they could come to was that it was a substantial reduction, because I mean, it's a reduction of whatever they said, 10 point something percent of NO2.
MS. ADELMAN: Ten point eight.
MS. CORDRY: In terms of the idling, it was like an 80 percent reduction in idling from the E-ZPass. So it

really made a dramatic difference in --
MR. GROSSMAN: Right.
MS. CORDRY: -- in that kind of effect, a very --
MR. GROSSMAN: Okay.
MS. CORDRY: -- quick effect.
MR. GROSSMAN: It's --
BY MS. CORDRY:
Q In Exhibit 372(a), Mr. Angelo Bianca of the Maryland Department of the Environment stated that the cumulative impact of the range of pollutants associated with gas stations was not well understood and that a prudent approach would be to establish buffers between the station and the public. What's your view of that statement?
A Where are you?
Q I'm --
MR. GROSSMAN: He's somewhere -- I mean, she's --
BY MS. CORDRY:
Q I'm reading from --
MR. GROSSMAN: -- in a completely different exhibit.
BY MS. CORDRY:
Q I'm sorry. We're moving on. We're moving on.
A Okay. What's the exhibit we're in?
Q It's an exhibit that's already in the record, 372(a).

A Can you show me the cover, because mine aren't numbered?
Q I didn't bring that in because it's already in the record. I'm just --
MR. GROSSMAN: She's just quoting from a Maryland health official.
BY MS. CORDRY:
Q I'm just quoting it. I'm quoting you a statement and asking you to --
A Oh, okay.
Q -- agree or disagree or whatever your view of the statement is.
A Say it again.
Q He stated that the cumulative impact of the range of pollutants associated with gas stations was not well understood and that a prudent approach would be to establish buffers between the station and the public. What would be your view of that statement?
A I think that's prudent. I agree that it's not well understood, it's not well studied, and in the face of uncertainty, you have to decide what's prudent, and a buffer is certainly a prudent approach to dealing with that.
Q Okay. Next, I'd like to, again, just sort of making that point -- and this may be a bit of overkill to put the whole article in to make the point -- but this one

would be the next exhibit. It's labeled --
MS. ADELMAN: Is this the U.S. EPA?
MS. CORDRY: Yes.
BY MS. CORDRY:
Q It's the one that's labeled U.S. EPA particulate matter research centers: summary of research results for 2005 to 2011. And is this the study you were associated with?
A Well, it's a number of studies. Right? So a little bit of just quick background. So the EPA funded --
MR. GROSSMAN: Can you hold on one second? I'm sorry, but I do have to mark the exhibit --
MS. CORDRY: Yes.
MR. GROSSMAN: -- and identify it --
MS. CORDRY: Right.
MR. GROSSMAN: -- before we proceed. So Exhibit -- we have to go through all this folder, also, that there's a record that somebody else can understand. Exhibit 444 --
MS. CORDRY: Right.
MR. GROSSMAN: -- is U.S. EPA particulate matter, which I'm going to abbreviate as PM, research centers: summary of research results for 2005 to 2011. Okay.
(Exhibit No. 444 was marked for identification.)
BY MS. CORDRY:

Q All right. And, again, what was your role with respect to this, preparing this particular article?
A So very briefly, the EPA funded a variety of centers at different universities around the country to look at research on particulate matter air pollution to help them regulate particulate matter air pollution, and I participated in the center at Johns Hopkins. And at the end of the five-year funding, they asked us all to get together and write one paper that kind of hits the highlights of everybody's findings. So this is a summary of research from, I think there were seven centers. I can't remember exactly, had to be there.
Q So I will proffer to you that the cutoff date stated in the Federal Register for its assessment on PM2.5 was mid-2009. That being the case, this paper was done when? Your paper --
A I'm sorry?
Q -- your summary was done when?
A Well, this was published in 2012, but we probably worked on it for a good year and a half before that. It's hard to write a paper with this many people.
Q Right. So in any case, but this is dealing with research, a good bit of which took place after the cutoff date --
A Yes. Yes.

Q -- for the PM2.5 rule? Okay. And I am not going to try to go into all of these things here because, having read it myself, it's more confusing than it is to do everything. But what I would like to do is, if you'd go to the last page, like the text there before all those many, many, many citations --
MR. GROSSMAN: Okay.
BY MS. CORDRY:
Q -- the part labeled Future Directions.
MR. GROSSMAN: Yes. That's page something.
MS. CORDRY: I can't really find a page number on it. It must have one.
MR. GROSSMAN: Maybe it's in the --
THE WITNESS: This is the electronic version. So they don't page number it.
MS. ADELMAN: Is this in Conclusions?
MR. SILVERMAN: Future Directions. It's right before --
MS. CORDRY: Yes.
MR. GROSSMAN: They ought to page number it.
MS. CORDRY: What?
MR. GROSSMAN: I said they ought to page number it --
MS. CORDRY: Yes, they ought to, but --
MR. GROSSMAN: -- even though they don't.

MS. CORDRY: -- in any case, it's relatively easy to find because you --
MR. GROSSMAN: Yes. I got it.
MS. CORDRY: -- stop reading all the tiny fine print that you can't find and right above there.
MR. GROSSMAN: Right.
BY MS. CORDRY:
Q In terms of the future directions, can you point out whether some of these things relate to what you've been saying now about the pollution regulation?
A Sure. So, for example, we say that the, in particular, the focus should shift from single components and sources to understanding the effects of multi-pollutant mixtures. So we want more long-term research to kind of address this. And so I think that's, that's relevant to this. This is, in part, giving direction to the EPA, further direction to them to kind of explore the multi-pollutant regulation.
Q Okay. All right. Moving on from these other people's studies to your own work, do you have other bases for concern with respect to the NO2 levels, short or long term, with respect to the kind of levels you're seeing around the mall?
A So we measure NO2 in kids' homes and the homes of people with COPD. So it's a little difficult to translate

our data exactly to the EPA levels because the measurement technology we use is different from the EPA's. So we can measure pollutant concentrations over a weeklong period of time, and so it's not clear, you know, kind of how that relates to the annual average, but I think it's probably closer to kind of representative of kind of a long-term chronic exposure. But we certainly saw effects of kids with asthma, in terms of NO2 exposures, in the 2- to 200-, kind of, parts-per-billion range, certainly within the range of model values we see here. We saw exposures to adults with COPD, the long-term exposures of adults with COPD, in a range of exposures we're seeing here that are associated with exacerbations of adults with COPD.
Q Okay. And if we can wait just -- if you can hold up just a minute.
MS. CORDRY: If we could put in -- Abigail, please.
BY MS. CORDRY:
Q I'm going to hand you two, two additional studies and ask you to identify those first.
MS. ADELMAN: And they are In-Home and the Longitudinal study?
MS. CORDRY: These two. I guess that would be 445 and 446.
MR. GROSSMAN: Well, I didn't want to go -- oh,

another one coming?
MS. CORDRY: Oh, it's coming.
MR. GROSSMAN: Okay. So Exhibit 445, thank you, is an October 2008 study: A Longitudinal Study of Indoor NO2 Levels and Respiratory Symptoms in Inner-City Children with Asthma. And then Exhibit 446, In-Home Air Pollution Is Linked to Respiratory Morbidity in Former Smokers with COPD, and that's dated somewhere. That's 5/15/2013. Okay.
(Exhibit Nos. 445 and 446 were marked for identification.)
BY MS. CORDRY:
Q Okay. So were these the two studies you've been referring to when you've talked about the study of children and the study of --
A Yes.
Q -- COPD patients? Okay. And in terms of looking at the children's study, what was one of the main variables you had in terms of the level of NO2 in the home, for instance?
MR. GOECKE: I'm sorry. Which exhibit?
MS. CORDRY: 445.
MR. GOECKE: Thanks.
THE WITNESS: Well, the mean in-home NO2 concentration was 30 parts per billion, and it ranged from 2.9 to 394.

BY MS. CORDRY:
Q Who had the 394?
A They have an odd practice in some inner-city homes: when they run out of fuel oil to heat their homes, they use the oven to kind of heat their home, and so in some cases, the parents would huddle in the kitchen in the morning and they'd turn the oven on, open the door, and they'd crank it up. And of course, the oven is a flame, and the same flame in an oven creates NO2 just like a car would create it. So there's some extreme circumstances like that.
MR. GROSSMAN: I take it, that wouldn't happen, though, with an electrical stove, just with a --
THE WITNESS: Correct.
MR. GROSSMAN: -- with an open flame?
THE WITNESS: Yes. Yeah.
BY MS. CORDRY:
Q So in addition to ambient air levels, are people then also -- didn't they also have the background of being exposed to other kinds of sources of --
A Certainly.
Q -- NO2, as well, that --
A Yeah.
Q And is that all part of the burden that they --
A Yes.
Q -- they bear when they go out in the world? Okay.

And -- okay. And did you find an effect as NO2 levels went up in your study?

A Yes. We saw increased asthma symptoms, and specifically, we saw limited speech due to wheeze; wheeze, cough, or chest tightness while running; coughing without a cold; and nocturnal awakening to a cough, wheeze, or shortness of breath. These are all kind of typical kind of symptom indicators of asthma morbidity, and they were all significant, and it ranged from a 12 percent to a 17 percent increase. And then the way we expressed this kind of exposure-response relationship, so for every 20-ppb increase in NO2 exposures, we saw, you know, a range from like a nine to a 17 percent increase in these symptoms. So every time it went up that much, we saw that much.

Q And do you have to have a full 20 percent, or is that just --

A No. That's just a factor that we kind of calculated. We could have expressed it as the percent, symptoms per each one-part-per-billion increase or for each 10-part-per-billion increase. It's just the number we chose because other studies had published it that way in the --

Q Right.

MR. GROSSMAN: And what happened in houses where it was 390?

THE WITNESS: So, you know, we didn't look at it

that way, right, because, you know, that's just part of the mix. We follow kids, and a kid might be at a 390 one visit; they might be down at a 100 the next visit because, of course, during the summer, he's not going to be a 390. But clearly, the risk was being driven by the high end of the exposure as well as kind of the middle, and so we started with a big campaign to get kids -- get parents, to educate them about not using their stove to heat their kitchen; if they need to do that, just buy an electric heater and just kind of heat it up with an electric heater.

MR. GROSSMAN: Okay.

BY MS. CORDRY:

Q And so that study was done in -- it was published in 2008. Do you recall what time period you basically were, time period you were studying these kids?

A A good five or so years before that.

Q Okay. And then we have the, your second study, which is 446, and that was done, looks like it was published in 2013. Can you talk about that one a little bit in terms of, also, the mean and median levels and so forth that you're talking about?

A Right. So this is a similar design, though instead of following kids to see how their asthma symptoms vary, we follow adults with COPD and we look for exacerbations of COPD. And there's a specific medical

definition for an exacerbation, but certainly -- by definition, a severe exacerbation is one that requires you to go to the hospital; so you have to, like, have a health encounter based on that. And the NO2 exposures here were much lower, so -- for a couple of reasons: they have, the frequency of gas stoves were lower in this population; this was not primarily an inner-city population, like we see in the Baltimore City asthma cohort, so their exposure to kind of traffic-related pollutants is going to be less, so the infiltration from outside is going to be less.

So it's not unusual in an elderly population to see indoor exposures that are different than an active home full of lots of young kids and everything that comes along with having a lot of young kids. And so these exposures were much significantly lower. So the NO2 concentrations were, on average, 10 to 10.8 parts per billion in the bedroom and 11.8 parts per billion in the main living area of these homes.

Q And if we translate those into micrograms per meter cubed, which is roughly doubling them, a little less than that, we're talking in the range of about 20 micrograms?

A Correct.

Q That was your average level?

A Yeah.

Q Okay. And what about for PM2.5 -- was that also something you measured and studied?

A Yes, we did. And so our PM2.5 exposures are, if you see here, are 11 to plus or minus 13 micrograms/cubic meter in the, in the bedroom and 12 micrograms per cubic meter in the living area.

Q And if we go back to this interquartile range, which is your 25 to 75 percent of people there, what was your range there for the PM2.5?

A The interquartile range for PM2.5 was 8.3. That means it went from 4.9 to 14.4 and 8 -- and 4.8 to 15.1 for the, for the bedroom and the living area. The mean indoor, the mean indoor for NO2 was 6.8 and 8.0 respectively for the, for the living area and the bedroom.

Q I'm sorry. That's your interquartile range?

A Right. That's on --

Q Okay. So --

A -- page 213.

MR. GROSSMAN: Although, strangely, you didn't find an association between PM2.5 concentrations in the bedroom and respiratory morbidity.

THE WITNESS: Right. So there's some odd things we saw in this study, and in part, it -- you learn some things when you do a study, but one of the things we asked people is, you know, we note where their bedroom is, but we

didn't know a good enough job about where they slept, right, and we got information afterwards that very often, you know, people slept -- if they're very morbid in terms of their COPD, they didn't move around a lot, and so they tended to sit in their chair and spend their day in their chair, and they slept in the chair.

So our original kind of model was, you know, they're going to be sleeping in the bedroom, we want to measure the bedroom; they're going to spend the rest of the day around the house, which is true for kids, but probably not true for this population. So I think we saw some differences in terms of the placement of the monitor and the morbidity that are probably a little bit confounded by not knowing exactly where the people slept, and we learned on this study that we have to do that better next time.

BY MS. CORDRY:

Q Again, did you use one of these standard sort of change per so many parts per billion?

A Yes. Yes.

Q And let's look at severe exacerbations since that seems to be a fairly significant health effect there. What did you find there?

A If you looked at Figure 1, you'll see that the NO2 in the bedroom was associated with severe exacerbations and the PM2.5 in the living area was associated with severe

exacerbations.

Q If you look at Table 2 above there, does that give you those specific results?

A Yes, they do.

Q Okay. So, for instance, for that 10 -- you said, I think, that there was about an 8.3 range between the 25th and the 75th percentile. So over that slightly broader range in that, that would be about 10 micrograms. What would be the result of somebody who was at that five versus somebody moving up to the 15 level?

A Well, you'd expect a 50 percent increase in severe exacerbations.

Q Did you essentially have a chart, again, coming back to this, did you see any threshold in your numbers over that range that you were looking at?

A Well, you know, we didn't look for threshold or in that sense. Right? So if you designed a study kind of looking for threshold, it would be something differently. We just looked at what exposures were there, and we saw health effects at those exposures.

Q Okay.

A So it's probably not fair to say did you find a threshold --

Q Okay.

A -- because we really didn't look for it --

Q Did you --

A -- but there's no evidence of one here.

Q Okay. Were you seeing these effects all the way up and down the scale that you were --

A Yes.

Q -- of ranges that you were looking at? Okay. And by the same token and if you move over to the NO2 on that same Table 2, it says 1.86 for severe exacerbations. Would that say that then you had an 86 percent higher chance of that for a 20-part-per-billion increase in NO2?

A Yes, but that wasn't -- that was not particularly significant.

Q Okay. Even that much isn't -- okay.

A Yeah.

Q But the other one was? The NO2 was --

A Yes. Yes.

Q Okay. I'm sorry. The PM2.5 was. All right.

A So it's complicated, right, but there's a, this is one of the first suggestions -- and I think this got published in a very prestigious journal, in part because it's one of the first papers, like I said, before they began to look at air pollution and health effects in people with COPD. And we felt there was enough of a signal here to suggest that air pollution is a, is a cause of exacerbation in people with COPD, and we used these data, by the way, to

get a big grant from NIH to look at this more clearly, both in a national study and to do an intervention study here in Baltimore, where we're going to take people with COPD and we're going to put air cleaners in homes and see, if we lower the pollution on purpose, can we improve their morbidity. And those are the kind of studies that I think are going to begin to nail this question a little bit better.

Q Okay. And if you look at, again, going back to our 255 chart here, if you look at the page that has Figures 11 and 12 on it, these are ones using the annual average NO2 results. So between -- if you're looking at one-week levels, would you, are those somewhere between one-hour and annual but probably closer to the annual level? Is that what you were saying?

A I suspect they're probably more appropriately compared to an annual average --

Q Okay.

A -- than a one-hour average --

Q So even --

A -- but it's not a perfect comparison in either, in either way.

Q Right. If we look at these, we're seeing that -- these levels I look at, I see going from, looks like about 30 now in Figure 12 up to a 34 line, with a maximum of 35?

MR. GROSSMAN: Figure 12?
MS. CORDRY: Figure 12.
MR. GROSSMAN: Okay.
BY MS. CORDRY:
Q Or actually, it's actually two lines, it looks like, below the 31. So it looks like it maybe goes down to 29 there, so 29 up to 34, with the maximum being 35. So that would put us in a range of 15.4 to 18-and-a-half parts per billion --
A Right.
Q -- and is that in the range of what you were looking at in your study there for the NO2?
A Those are consistent with the exposures, part of the distribution exposures we saw in our studies.
Q Okay. And that's rural, and the urban is not hugely different. It looks like it's going from 26 up to 31 as a max, which would, again, give us numbers of roughly 14 to 16 and a half.
A Yeah.
Q So these would be levels that you would look at, even with these refined assumptions, as being in the range that you were seeing health effects from long-term exposures in this range?
A Absolutely. These are the type of levels right now that are the focus of our expanded study on the national

level to look at kind of, on a broader scale, do we see the same health effects that we saw on our smaller-scale study.
Q And those levels are going out to the backyards of people's houses on these lines and so forth?
A It appears so, yes.
Q Okay. All right. In his testimony on September 16th, at page 197, Dr. Chase testified he thought you wouldn't likely have health effects from PM2.5 until you got up to about 15 micrograms per meter cubed. Would you agree or disagree with that statement?
A Well, I think I'd have to disagree with that statement. The current standard is 12 micrograms/cubic meter. So clearly the EPA administrator thinks there's health effects down to that level currently. So even, I think, the state of the regulatory science, which I said before is usually a few years behind kind of the published science, already suggests that that's probably, the threshold is probably below the 15 level.
Q All right. So you said that actually the NO2 now is out for, there's a -- review has been done. Do you know what status that is under, what's going on with that at this point?
A They have a draft document that's floating around.
Q Okay. And as it floats, do you know what, what is -- what's the process there? What's --

A Well, it's floating around because, you know, people, they don't, they don't keep it secret. It's not like that, but you're not allowed to, you know, certainly you can't, it's not -- it's a draft; so you can't say here's what the, definitively --
Q Right.
A -- what the document has concluded or what the EPA administrator has said, and so they ask you not to, like, cite it in a document or publication or quote it specifically.
Q Right, but it's out for public comment at this point, is that --
A Yeah. Yeah.
Q Okay. For people to analyze. Okay.
MR. GROSSMAN: Well, is that the same draft we're talking about, that we've seen before here?
MS. CORDRY: Yes, the 2013 draft, right. I just --
BY MS. CORDRY:
Q So it is definitely not something where you're supposed to take this as the EPA's opinion yet, correct?
A Right.
Q Okay. I am going to, though, show you a few pages from that, and I will let you decide whether you think these are fair questions to ask from that for a moment.

MR. GOECKE: I would object to the use --
MS. CORDRY: Well --
MR. GOECKE: -- of the document for the reasons just discussed. It's not --
MS. CORDRY: Well --
MR. GOECKE: -- it's not --
MR. GROSSMAN: Well, let's see what the question is first. We don't know if it's objectionable until we hear the question.
MS. CORDRY: Right. I understand those strictures he just mentioned, and I think what I'm going to suggest is not going to go outside them, but you can decide.
MR. GROSSMAN: And what am I --
MS. CORDRY: Okay.
MR. GROSSMAN: -- what was I handed here?
MS. CORDRY: Okay. These are 16 pages of excerpts from the 2013 ISA Draft that is currently out for public comment.
MR. GROSSMAN: Okay. So this is Exhibit 447.
MS. CORDRY: 447.
MR. GROSSMAN: Exhibit 447 is excerpts from ISA Draft -- what should I call it? Draft what?
MS. CORDRY: Just call it the 2013 Draft.
MR. SILVERMAN: ISA.
MS. CORDRY: The 2013 ISA Draft. That's probably

the --
MR. GROSSMAN: Okay. 2013 ISA Draft.
(Exhibit No. 447 was marked for identification.)
MS. CORDRY: And it came out at the end of November of 2013.
MR. GROSSMAN: Okay.
BY MS. CORDRY:
Q All right. So if you're looking at that draft and you're trying to decide what to comment on it, can you just tell us what these kind of figures that you're seeing here, what these would be compiling, what these figures are and the table?
A So they're trying to summarize as much as the literature as possible on a, in a concise a way as possible.
Q Okay. And I see, you know, it talks about odds ratios. Now, what is that?
A So an odds ratio, it's similar to a relative risk. So the odds of suffering occurring is, you know, if the odds are the same, then an odds ratio one; an odds ratio is higher than one, it's something, you increase your risk of whatever it is you're looking at being, being present.
Q So when you were saying that there was a 50 percent higher ratio, or 50 percent higher chance, it would be like an odds ratio of 1.5?

A Yes.
Q Okay. And it talks about effects estimates are standardized to a, particular levels of increase. What's going on with that?
A Well, you know, every study kind of presents their data kind of differently. So they try and standardize it so you can compare apples to apples.
Q Okay. So for any study that was using a 24-hour average, they would look at a 20-parts-per-billion --
A Yes.
Q -- they'd adjust it all so that all their, so you can --
A Right.
Q -- line these numbers up? Okay. And then right behind there there's a table.
A Yes.
Q Okay. And what's in the table?
A So --
MR. GOECKE: Are you talking about Table 4.17?
MS. CORDRY: Yes. I'm sorry. Yes, Table 4.17.
THE WITNESS: So this just summarizes for a range of studies the -- for a number of studies, the range of exposures that they're looking at in terms of the health effects that they're seeing.
BY MS. CORDRY:

Q Right. So this would be the details of what is -- if the front page is kind of the bottom line, what's behind there is some of the details of those studies, is that right, in the table?
A Yeah.
MR. GOECKE: Objection. Leading.
MR. GROSSMAN: No. I think it's fair to have the, to summarize what she thinks the witness is saying. So I don't have that as a problem.
MR. GOECKE: Okay.
MR. GROSSMAN: It's overruled.
BY MS. CORDRY:
Q So is that --
A Yeah. So these summarize kind of the exposure levels associated with the health effect studies.
Q Okay. So if you're trying to determine for yourself, to look at some of these things and look at what studies you find, you can look at, you can look at this list and look at where the studies are, what the range is, what the EPA is now going to be examining, is that correct?
A Yeah.
Q Okay. And when you look at this list, what do you see in terms of what you've been saying about health effects you've been seeing at levels below the standard?
A Right. So --

MR. GROSSMAN: I'm going to stop you now, and let me go back to the question of the, of whether or not this is objectionable. So if I understand you right now, this is, what you're discussing now is a compilation of studies --
MS. CORDRY: Right.
MR. GROSSMAN: -- not of the proposed, any proposed EPA --
MS. CORDRY: Right.
MR. GROSSMAN: -- thing? Okay. I think, to that extent, it's not objectionable.
MS. CORDRY: Okay.
MR. GROSSMAN: Would you agree with that, Mr. Goecke?
MR. GOECKE: Because the studies stand on their own and this is just a --
MR. GROSSMAN: A compilation of the studies, right.
MS. CORDRY: Right.
MR. GOECKE: -- document that purports to compile them?
MS. CORDRY: Right.
MR. GOECKE: That's fine.
MS. CORDRY: Right. They're --
MR. GOECKE: I don't understand why we're not just talking about those studies instead of using this document.

It --
MS. CORDRY: Well --
MR. GOECKE: -- clearly says do not rely on it, but --
MR. GROSSMAN: Well, it's a convenient summary, I suppose, is what --
MS. CORDRY: Well, for one thing, there's 900 pages' worth of studies, or 900 pages of discussion of the studies. The studies themselves, if you went through all of this, would be --
MR. GROSSMAN: Right.
MS. CORDRY: -- thousands of pages --
MR. SILVERMAN: Our record --
MR. GROSSMAN: And I think that's --
MS. CORDRY: -- and we are trying not to actually ask you to do all of this.
BY MS. CORDRY:
Q What I am trying to do is, at a high-level summary, if you look at what is currently under the examination and you look at these in terms of your evidence about health effects and looking at this compilation, I'm really just asking you, if you look at this, what are the, what are the ranges of the studies that the EPA is going to be considering and how -- and then the second question will be, how does that relate to the kind of levels we're seeing

around here?
A So I think we see exactly what we talked about at the beginning, that we're now seeing more and more studies being done at lower concentration levels than we had in the past. So the evidence base -- you know, as the standards come down, the evidence base and health effects and exposures at those levels/below those levels is increasing. So this creates a pool of studies now that the EPA can take, draw more evidence from in terms of their rule-making.
So we see a number of studies that have short-term exposures that are, you know, certainly down in the, you know, less than 20-parts-per-billion range, and you know, it's up to the EPA now to integrate this into kind of one assessment to kind of make sense out of it. But certainly we're seeing studies now that are under consideration that are looking at exposures that are consistent with what we're, might expect based on the modeling that's been done. And so we would anticipate, I think, a more informed kind of standard to come out that might look at, more specifically, at the types of exposures --
MR. GROSSMAN: Well, I'm not going to anticipate what they're going to do, but let me, let me ask if you'd explain what this chart, how to read this chart on page 4-124, which is the first page of Exhibit 447. What do the location of these little dots and lines mean to me?

THE WITNESS: I'm sorry. I don't have that same, what --
BY MS. CORDRY:
Q The very first page of the exhibit here.
MR. GROSSMAN: First page.
THE WITNESS: Okay. All right. So the most important thing you can take from this line is that if, if there was a negative effect, that means if there was no effect between NO2 and these health effects -- this is respiratory symptoms and asthma medication use, right -- if there was no association, you'd expect half those dots to be on one side of one, half those dots to be on the other side of one.
MR. GROSSMAN: Okay.
THE WITNESS: Right? Because, by chance, you're getting some that show high, some that say low.
MR. GROSSMAN: Right.
THE WITNESS: Right. So just looking at overall, the fact that almost all the dots are to the right-hand side tells me something. Right? Now, any one study -- so the line now represents whether it's significant or not. So if that bottom, the back of the line crosses one, you'd say that was a not-significant study by itself, but what the EPA is going to do then, is they're going to take all these studies -- that's why they kind of put them on the same

basis -- and they're going to combine them into one study, because the more studies you have, the more power you have, and they're going to come up and see is there a combined estimate that represents a risk and is that risk significant or not, does it cross that one line.
MR. GROSSMAN: Okay. So the one line, that vertical line at the one axis there, things to the left of that would be an indication of no effect --
THE WITNESS: Right.
MR. GROSSMAN: -- from these levels of NO2, and I guess this is 24-hour NO2 levels or --
THE WITNESS: Well, I think they have different, they have different studies here. So they're trying to --
MR. GROSSMAN: Okay.
THE WITNESS: -- they're trying to pull lots of different --
MS. CORDRY: That's what we said about, they standardize all of them. So --
MR. GROSSMAN: Okay.
MS. CORDRY: -- they all should have about the same amount of effect based on that the levels of change.
MR. GROSSMAN: All right. And these were at levels of 20, 25, or 30 parts per billion --
MS. CORDRY: No. That's the standardized effect. That's the point of the table 4-7, I mean, 4-17. 4-17 tells

you the absolute levels, the actual measured levels.
THE WITNESS: So the studies that -- the exposures that these studies represent --
MR. GROSSMAN: Yes.
THE WITNESS: -- are typically kind of in the ranges that we're talking about now.
MS. CORDRY: For instance, if you look under Wheeze there on the first page, the first --
MR. GROSSMAN: I'm looking for 4-17.
MS. CORDRY: It's the second page there.
MS. ADELMAN: It's the second page.
MR. GROSSMAN: Oh.
MS. CORDRY: The table, 4-17.
MR. GROSSMAN: Yes. Okay.
MS. CORDRY: So if you look under Wheeze and you see the study there that's labeled Mann et al. (2010) --
MR. GROSSMAN: Look under Wheeze?
MS. CORDRY: Wheeze. That's the effect. There's several different effects they're looking at here.
THE WITNESS: Wheeze. No, on the first page.
MR. GROSSMAN: Oh, wheezing.
MS. CORDRY: Wheezing, yes.
THE WITNESS: Look on the first page under Wheeze.
MS. ADELMAN: First page.
MR. GROSSMAN: All right.

MS. CORDRY: I'm sorry. On the first page --
MR. GROSSMAN: Trying to confuse the Hearing Examiner, you know.
MS. CORDRY: I'm trying not to. If you look at the first page under Wheeze, it has Mann et al., a 2010 study.
MR. GROSSMAN: Yes. I see it.
MS. CORDRY: And then you go over there and you find the little dot and that's the calculated odds ratio.
MR. GROSSMAN: Right.
BY MS. CORDRY:
Q That line, Dr. Breysse, that represents the confidence interval, is that correct --
A Yes.
Q -- that we've been talking about?
A Yeah.
Q What does it mean how long or short the line is?
A Well, the longer the line, the more uncertain you are; the shorter the line, the more certain you are about that.
MR. GROSSMAN: Right.
BY MS. CORDRY:
Q Okay. So that would go with a higher P -- no, I guess a smaller P value, a greater --
A Well, yeah. It's a smaller confidence interval,

yeah.
Q -- a greater confidence interval?
MS. CORDRY: And then if we go down on Table 4-17 on the second page there, if you look up just above the bottom, you'll see that Mann study referenced.
MR. GROSSMAN: Yes.
MS. CORDRY: So you can see it was done in California, it was done at a particular period of time, it happened to use 24-hour measurements on NO2. The median level is 18.6. So that's the mean, the mean kind of point there. The highest level, the very highest level they measured was 52.4.
MR. GROSSMAN: Right, but what I -- I was referring to the fact that right at the bottom on the front page --
MS. CORDRY: Right.
MR. GROSSMAN: -- you'll see just below the horizontal index --
MS. CORDRY: Right.
MR. GROSSMAN: -- there's the words odds ratio --
THE WITNESS: Right.
MR. GROSSMAN: -- per 20, 25, or 30 parts per billion in NO2.
MS. CORDRY: Increase. Increase.
THE WITNESS: Right. So let me -- so in the study

they looked at exposures that ranged from 20 to 50 parts per billion, something like that. For each 20-micrograms-per-cubic-meter increase, they would see a, I can't read down exactly, but somewhere less than one -- less than a 50 percent increase in symptoms of wheeze, but that scaling factor is just a mathematical thing. I could have put that as per one part per billion, I could have put it as 10 parts per billion, I could put it as five. It's just a standard way of kind of expressing it: for each unit increase in exposure, how much pollution-related risk do you expect to see? And then the next question is at what levels did they see that increase, and that's what the second table shows.
MR. GROSSMAN: Right. I was just trying to understand what they were getting at by that labeling of the odds ratio per 20, 25, or 30 parts per billion.
MS. CORDRY: Okay. That goes with, if you go down, the two little hard-to-read lines, text under there: Effect estimates are standardized to a 20-part-per-billion increase for 24-hour average or 15-hour average, 25 parts per billion for four-hour average, six-hour, eight-hour, and 30 for one-hour --
MR. GROSSMAN: I see.
MS. CORDRY: -- because the shorter the time period, the bigger volume you get. So --

MR. GROSSMAN: Okay. All right. Now I understand that. I just wondered what --
MS. CORDRY: So now they try to pull all of them together so we can put all of them on one chart.
MR. GROSSMAN: Right. Right. Okay.
THE WITNESS: It's an attempt to standardize.
MR. GROSSMAN: All right. I got you.
MS. CORDRY: All right. So that, that -- and it's just, we did several examples, and we won't go through all of them again, but Figure 4-4 is respiratory-related hospital admissions and, again, the same kind of table behind there.
MR. GROSSMAN: The implication of this exhibit, 447, at least as far as you've gone, is to say that it appears that at these levels studied, that there's some impact?
MS. CORDRY: That there are a lot of studies and a lot more that have come out since the EPA report that they have, and if you look at the levels that are being done, we are looking at levels where health effects are being seen right in the range of where we're at.
MR. GROSSMAN: I understand. Okay.
MS. CORDRY: So that's the point of that.
MR. GROSSMAN: Okay.
MS. CORDRY: To cite to one specific study here --

and we're only going to do one --
MR. GROSSMAN: Bless your heart.
MS. CORDRY: -- if you go down to, it's about the 11th or 12th page in there, but it's one of the few ones that has text. It looks like this. It says, Concentration-Response.
MR. GROSSMAN: What's the number on the bottom of the page?
MS. CORDRY: Oh, I'm sorry. Yes, 4-172. I forgot, it did have page numbers on this.
MR. GROSSMAN: Okay. I've got it.
MS. CORDRY: And then 4-173 has a chart there, and we actually --
MR. GROSSMAN: Okay.
MS. CORDRY: -- pulled that study out and have that particular study available to give to you all. So that would be this one. Down to our last two exhibits.
MR. GROSSMAN: That's good because I'm running out of room on the page here to list them.
MS. CORDRY: So that would make that one 448, I believe.
MR. GROSSMAN: Yes.
MS. CORDRY: Do you want to start writing while I tell you? It says: Short-Term Associations Between Ambient Air Pollutants and Pediatric Asthma Emergency Department

Visits, and you got the rest of it there.
MR. GROSSMAN: Okay.
(Exhibit No. 448 was marked for identification.)
MS. CORDRY: With that particular graph that's on page 4-173 --
THE WITNESS: It shows an exposure-response curve.
MS. CORDRY: Right. And it does come out of the same study that we're now just putting, that he is introducing on the record as 448. I like this one in particular because it's blown up. So when we look at, in 4-48, or I'm sorry, 448, you'll see it's a little smaller and a little harder to read. Okay.
MR. GROSSMAN: What page are we on?
MS. CORDRY: We're looking at page 4-173 --
MR. GROSSMAN: Okay.
MS. CORDRY: -- in Exhibit --
MR. GROSSMAN: Right.
MS. CORDRY: -- 447, and that is a graph taken out of Exhibit 448.
MR. GROSSMAN: Okay.
BY MS. CORDRY:
Q And can you talk to us just a little bit about this study, the 448 study?
A So this is a large study of asthma emergency

department visits in Atlanta, and it was from 1993 to 2004. And so they looked at 91,000 ED visits, and they tried to associate the ED visit pattern with the air pollution pattern. And here you see that exposure-response curve, that when the concentrations were low, the risk ratio was low; when the concentrations were higher, the risk ratio was higher, and it goes up in a, not in a linear exact fashion, but in a, certainly in an increasing fashion with increasing exposure.
So this is one of the studies that, I think, are going to help inform the new EPA standard on nitrogen dioxide, and they saw this, interestingly, during the warm season and not as much during the flu season; this is -- during the winter season -- this is for pediatric asthmatic patients. And so the EPA document is kind of highlighting this study as an example, one that's got good exposure-response relationship. And, again, we're seeing increased risk ratios. So, again, 1.15 says there's a 50 percent increase in a, in an ED visit at increasing exposures, and certainly, again, the exposures are kind of in the area that, in the ranges that we are worried about seeing as associated with the gas station in this --
Q I'm sorry. I'm sorry. You said a 50 percent. Do you mean 15?
A Fifteen.

Q Fifteen percent, yes.
A If I said 50, I meant 15.
Q Okay. And the range of exposures we're looking at there, it looks to me like that is probably, it doesn't go down all the way to zero, I don't believe, because it's talking about between the fifth and the 95th percentile. So that would, if I eyeball that chart, it looks to me like it's probably starting at about five parts per billion --
A Yes.
Q -- and going up to a little bit over 35. Is that -- that's the range that they're looking at in terms of short-term exposures.
MR. GROSSMAN: I thought it was a no-no to start a chart at any place other than zero.
MS. CORDRY: Well, it is --
MR. GOECKE: Only when Costco does it.
MS. CORDRY: No. It's not a problem --
MR. SILVERMAN: Only when it's misleading.
MS. CORDRY: -- if you label what you're doing.
MR. SILVERMAN: Only when it's misleading.
MS. CORDRY: When you label what you're doing and saying I am particularly studying a fifth to 95th percentile, yes.
MR. GROSSMAN: Just saying I'm paying attention.
MS. CORDRY: I understand, and we're explaining

why this is a valid study.
BY MS. CORDRY:
Q Okay. And just, just to sort of sum this up, if you look at his, on the very last page there, his conclusions as to what -- oh, I'm sorry, not his since there's about, as usual with these things, about 10 authors -- if you look at their conclusions, the last sentence on page 315 --
A In fact, the senior author is a woman.
Q Right. I --
MR. GROSSMAN: Page 315? Okay.
MS. ADELMAN: Which exhibit?
MS. CORDRY: Page 315 in Exhibit 448.
MR. GROSSMAN: And so what was her conclusion? Which --
MS. CORDRY: In the fourth --
MR. GROSSMAN: -- the last paragraph?
MS. CORDRY: Yes, the last paragraph of text in --
MR. GROSSMAN: Right.
MS. CORDRY: -- in there, in the very last sentence there. It starts, Further.
THE WITNESS: So it says: These associations were present at relatively low ambient concentrations, reinforcing the need for continued evaluation of the Environmental Protection Agency's National Ambient Air

Quality Standards to ensure that the standards are sufficient to protect susceptible populations.
MR. GROSSMAN: Well, actually, it says susceptible individuals.
MS. CORDRY: Okay, sorry.
THE WITNESS: Individuals? Individuals, sorry.
MS. CORDRY: Now, for my last exhibit, is -- we'll do this one.
THE WITNESS: The Harvard study?
MS. CORDRY: Right. I guess we'll make that one 449.
MR. GROSSMAN: Thank you. I appreciate that, Mrs. Adelman. Exhibit 449. All right. So this is July 2012 study: Chronic Exposure to Fine Particles and Mortality, and I'm going to put three dots so that --
(Exhibit No. 449 was marked for identification.)
MS. CORDRY: Okay, exactly.
BY MS. CORDRY:
Q All right. First, can you tell us what the Harvard Six Cities Study is?
A So it's actually a famous study where they -- well, the first studies looked comprehensively at particulate matter air pollution and health, and they looked at six cities -- in Steubenville, Ohio, through Topeka,

Kansas -- across the U.S., and they published their initial findings maybe 10 years ago, and it was key for setting the original PM2.5 National Ambient Air Quality Standard that was set. And this is an update of that, and they're trying to take advantage of the fact that exposures have come down, and the question is, are they still seeing the same health effects that they saw? And if you look -- what's informative, if you look at Figure 1, this illustrates kind of the good and the bad news, if you will, but I think there's a lot of good news here, and that's, as across these six cities, the exposure concentrations over time has come way down.
Q That's the good news, right?
A Right, that's good -- that's the good news. And so, in fact, if you look back in the late, in the 1980s/early 1990s, it would be hard to study exposures less than 10 micrograms per cubic meter because there weren't any, right, but now almost all the cities are, you know, between, you know, five and 15 micrograms/cubic meter. So what they're asking, the question is now, are we seeing health effects at these lower levels -- we know we saw them previously at the higher levels -- and the study concludes that there are health effects, and they said that health effects extend down to concentration ranges that include eight micrograms per cubic meter. So --

Q And where is that? Is that on the front page there?
A That's, I'm reading that from the abstract. So the authors conclude that this study provides additional evidence that there's ambient PM2.5 health effects at concentrations that are lower than we thought of, than we saw before, and in part, it's because they're able to study these exposures now because they didn't exist. And so while the current standard is 12 micrograms per cubic meter, I think studies like this suggest quite clearly that perhaps that needs to be reconsidered and needs to be brought down as well.
Q And if you look at the very end of this one again on their conclusion.
A Including recent observations with PM2.5 exposures well below the U.S. annual standard of 15 micrograms per cubic meter, which it was when this was --
Q Right.
A -- written, and going down to eight micrograms per cubic meter, the relationship between chronic exposure to PM2.5 and all-cause, cardiovascular, and lung-cancer mortality was found to be linear without a threshold. So they, they had not documented a threshold.
Q Right.
A Furthermore, estimated effects of PM2.5 did not

change over time, suggesting that there's a stable toxicity. That means each unit of exposure seemed to have the same sort of risk. So if you reduced it by 10, you know, it's the same reduction in kind of morbidity. So the PM is just as toxic as it was before; there's just less of it there.
Q And the last sentence?
A Then finally: These results suggest that further public policy efforts that reduce fine particulate matter air pollution are likely to have continuing public health benefits.
Q So if you will again pick up your Exhibit 255, and this time look at page 29, and these are the revised estimates with the new assumptions. This is with using a 10.8 microgram per meter cubed background for both rural and urban. Now, are you aware that in an earlier point in the case a 12.1 background was used?
A Yes.
Q Okay. And obviously -- well, let me ask you this, a different question first. Between the 10.8 and the maximum of 11.2 that's shown here, that's a .4 addition from the, what's being modeled here, is that correct?
A Yes. Yes.
Q Okay. So if we had a 12.1 background before and added another .4, we'd be well above the current 12 standard, is that correct?

A Correct.
Q Okay. If we are looking at an area that is 10.8 over this entire area, or that's the area background, and you're adding, even if it's only 10.8 and you're adding another close to half gram, half microgram, with these kind of levels and with seeing, with seeing what's being said in these studies, do you have a concern about adding additional pollution, even if you're below the 12 level?
MR. GROSSMAN: Let me stop you for a second.
MS. CORDRY: Okay.
MR. GROSSMAN: When you say adding half a microgram, what are you talking about?
MS. CORDRY: Well, this would show that the modeling shows that we're adding up to an additional, you know, we're showing the background at 10.8 and the max level of 11.2. So that's .4, and the other one is .42 micrograms per meter cubed.
MR. GROSSMAN: The other what is .42?
MS. CORDRY: Figure 20. If you look down there, the difference there between 11.22 and 10.8.
MR. GROSSMAN: All right. So you're just saying that the difference between the 10.8 background level and the max background level --
MS. CORDRY: Right.
MR. GROSSMAN: -- is about four --

MS. CORDRY: Right.
MR. GROSSMAN: -- micrograms?
MS. CORDRY: Point four.
MR. GROSSMAN: Point four, I'm sorry, point four.
MS. CORDRY: Right.
BY MS. CORDRY:
Q All right. So let me do the question a little bit different. Knowing what you do with the studies you've been looking at, the studies you've been reading and so forth, are you satisfied that being below 12 is sufficiently healthy, that it doesn't matter if we add this additional amount of pollution?
A I think we have to move below 12, and I think the EPA will follow eventually.
Q And, again, did you look at the background memo at all in terms of the backgrounds we discussed about alternative potential background levels?
A Well, you know, I know -- like I've commented before, I don't want to get too much into the detailed inputs in the modeling per se, but I'd like to note that, you know, it's very sensitive to assumptions you make. And so we see, again, that the values that we pick are going to change depending on the background assumption you make.
Q And does that also depend on which background monitors you pick?

A Well, they have to choose the monitors to kind of give you a background value. So picking a monitor -- you know, which one you pick and which one you call, which one you call background are all going to affect kind of the final answer that you get.
Q Okay. And then if you turn the page there on that Exhibit 255 that you had -- let me just back up a second. With the levels that we have here, whether they are 11.2 or whether there's any of those higher background levels that have been used at different times by Mr. Sullivan or added in, in the range, in this kind of range here, are you confident that there is not a health effect being -- that would be derived from this station?
A Well, these exposures all suggest the concentration would be above, I think, what studies like the Harvard Six studies, the revision of the Harvard Six studies suggest are going to be a health base. So I think these --
MR. GROSSMAN: What's the antecedent of these? Which figure are you looking at? When you said these effects and these, which -- what are you pointing to?
THE WITNESS: These, the Harvard Six studies suggest that --
MR. GROSSMAN: No. What are you pointing to?
THE WITNESS: I'm looking at Figures 19 and 20, I guess.

MR. GROSSMAN: Okay. Thank you.
THE WITNESS: You know, the micrograms per cubic meter are all above the levels at which the Harvard Six studies suggest there would be a health concern.
MR. GROSSMAN: Okay.
BY MS. CORDRY:
Q You would believe there are already health effects, even if only in background. Would that be fair to say?
A Yeah.
Q And that adding additional pollution to that, would that have --
A Would only increase it.
Q Okay. All right. To move to a slightly different area now, which we're almost to the end, turning the page, on Figures 21 and 22, these are graphs where the one-hour standards were taken and then there was an adjustment for the assumed time that somebody would spend in the queue of being 20 minutes and then the rest of the time the assumption was that they would be at a background level of 90. Looking at these figures and with that explanation, in your scientific opinion, is that an appropriate way of calculating concentrations for particular chemicals?
A I'm sorry. Say that again, please.
Q If you look at these charts and knowing what they

say they're doing --
MR. GROSSMAN: Which charts are you talking about?
MS. CORDRY: 21 and 22, Figures 21 and 22.
MR. GROSSMAN: Okay. All right.
BY MS. CORDRY:
Q This approach for determining what is an urban concentration, with using these 20 minutes here and 40 minutes elsewhere, is that an appropriate way of determining concentrations, in your opinion?
A Well, it's actually a lot more complicated than that. Right? So a person's exposure is going to, integrated over time and space, and we know their personal exposure is going to, going to vary greatly. I don't know if you can assume that there's only two places you can be in your whole day that's going to account for your NO2 exposure.
Q And in any case, would -- if you're trying to determine what is the concentration level for modeling or so forth, is this the way you determine what a concentration level is as opposed to --
MR. GROSSMAN: Well, let's not give him as opposed.
MS. CORDRY: Okay. All right.
THE WITNESS: I guess I still don't --
BY MS. CORDRY:

Q Let me ask this: Is there a form of analysis known as risk exposure for a particular person or a population? Is there risk exposure assessment calculations that are done?
A Yes. Yes.
Q Okay.
A So you can do an exposure assessment based on an estimate of what a person's personal exposure is going to be.
Q Okay. And do you have to, when you're doing that, do you have to start with established concentrations at particular places and see whether they're going to be there or not?
MR. GROSSMAN: The right way to say it is how do you start; not, do you start with.
MS. CORDRY: Okay. All right.
MR. GROSSMAN: You gave him the leading form.
MS. CORDRY: All right.
THE WITNESS: So you need to ask me what the person's personal exposure is going to be to do that. Right? In order to do that, you have to know where they are, how much time they spend there, and what the concentration is, and you can --
BY MS. CORDRY:
Q Right.

A -- kind of sum that across a period of time.
Q And is a determination of concentration independent of whether a person is there or not?
A Is a determination of concentration independent of whether a person is there or not? Well, the concentration at a fixed spot is the concentration at a fixed spot. Right? So you just need to know how much time somebody spends at that spot to assign them a concentration-time profile.
Q Okay. So that would be looking at that person's own personal risk exposure?
A That would be one way to do it, yes.
Q But in terms of whether you would define that as saying what is the concentration at a point, is that how you would -- by mixing the person's personal time at the exposure and the levels that are there, is that how you would set a concentration --
MR. GOECKE: Objection. Can we stop the leading questions?
MR. GROSSMAN: Yes, but let me ask you something different. Where are you going with this particular set of questions?
MS. CORDRY: Okay. Well, with this particular set of questions is, is this a meaningful or appropriate way of doing anything? Is this, is this mixing up two concepts

that don't belong together? This purports to be a --
MR. GROSSMAN: So you're saying this mixes up the question of concentration with the question of personal exposure; is that your --
MS. CORDRY: Yes. This purports to be a level of concentration, but this, this is not -- I mean, this isn't the way you do concentrations.
MR. GROSSMAN: Well, you're not allowed to testify, really.
MS. CORDRY: I understand that, but you asked me why I was -- you know, where I'm trying to get at is dividing up the question of is this the way you determine what a concentration level is --
MR. GROSSMAN: Okay.
MS. CORDRY: -- versus how do you --
MR. GROSSMAN: Is this the way to determine what a concentration level is?
THE WITNESS: I don't understand that question.
MR. GROSSMAN: All right. Let's go with something else because we --
MS. CORDRY: Okay.
BY MS. CORDRY:
Q If you are trying to determine somebody's risk assessment here, their risk exposure, even assuming they --
A Their personal exposure. Is that what you mean?

Q Well, yes, a person's exposure, yes.
MR. GROSSMAN: I think we've been over this same set of questions and this a number of times now, and --
MS. CORDRY: Well, I don't think --
MR. GROSSMAN: -- the witness has said he's --
MS. CORDRY: I was going to a different --
MR. GROSSMAN: -- he's not following the gist of what you're getting to.
MS. CORDRY: Okay. I'm trying to ask a different question, in the first place, that will actually go to -- but I think he can answer it, reasonably.
MR. GROSSMAN: All right. Go ahead.
BY MS. CORDRY:
Q I think you said that it wasn't clear whether the person would just simply be at 90 micrograms per meter cubed, they wouldn't necessarily be at the background. How does that relate to what you're talking about in terms of determining somebody's own exposure to risk?
A I apologize, Ms. Cordry. I'm --
Q Okay.
A -- having a hard time following exactly where you want to get at, but what I would do is I would -- you need to know kind of what the concentration is at a space in time and how much time a person spends in that space in time, or you put a sampler on that person and walks around with it

and that person -- it measures their exposure as they kind of walk around, which is the gold standard way of doing it. But otherwise, if we knew what the exposure was while they're sitting in line -- so obviously that would have to be what their exposure is in their car while they're sitting in line, not necessarily what the exposure is outside their car, right -- and then how much time they spend in line, how much time they spend driving on the road, what's the concentration while they're driving on the road, how much time they spend home, how much time they spend outside if they're home, we can piece together a person's exposure across a day that way.
Q So if someone --
MR. GROSSMAN: No. Let's move on to something else, okay? I think you've --
MS. CORDRY: Okay. All right.
MR. GROSSMAN: The witness has tried to answer three times.
MS. CORDRY: Okay. Well, I'm trying, I'm trying to get the questions to the point that he can answer them easily, which is --
MR. GROSSMAN: No, we've --
MS. CORDRY: -- for instance, let me --
MR. GROSSMAN: Just move to something else.
MS. CORDRY: All right.

BY MS. CORDRY:
Q I'd like to finish up with just talking a little bit about occupational issues there and that's my last few questions. Dr. Chase was asked on, in his testimony on September 20th at page 234 whether he would expect to see health effects from being exposed to levels of NO2 for one hour, and he testified: I'm not going to say none, but I've been practicing occupational medicine for 35 years, both in a full-time academic setting and in an active private practice, and I've never seen a single patient with such an exposure scenario who was symptomatic. In your opinion, is this sufficient evidence that exposures at that level will not cause adverse health effects in anyone?
A Well, there's a couple of problems, right, is, one is a lot of times if people are -- there's a bias called healthy worker effect -- if people are bothered by something, they leave the job. It doesn't mean if they aren't, but the people maybe who are, are more vigorous stick around than people who don't stick around. So just because you don't see somebody doesn't mean it can't happen. It doesn't mean it does happen. It might mean that they just don't stick around with those jobs.
All right. So that's part of the problem, but you have to compare kind of what a -- I would have to start by looking at what a person's eight-hour exposure was over a

day and compare it to guidelines that are published and probably not OSHA's exposure limits because we know they're out of date and they aren't routinely used other than just for deciding whether you're legally compliant or not. But I would refer to groups like the ACGIH, like I held, like NIOSH that I held, and the standard of practice would be, if your exposure approaches half of what we think is acceptable, you'd begin to kind of talk to those workers about are you having any health complaints and is there anything we can do to reduce your exposure, to kind of keep your exposure kind of at a healthy level.
So I'm not going to say a scenario like this, if somebody were working outdoors around this traffic queue for long periods of time or at this loading dock, they wouldn't -- they would a priori have no concern about occupational exposures, but --
Q And even before you get to occupational exposures, because I think, in context, his question, his answer was not necessarily limited to that, if you did not see reactions as an occupational practitioner to a level of 388, would that tell you that there was not adverse health effects for the population as a whole?
A No, that's probably not the best way to answer that question; so -- there's a lot of reasons why people might come and, why people might be complaining, when they

might seek out health care, and there could be lots of morbidity that's under the radar, so to speak --
Q And --
A -- so I wouldn't rule it out a priori.
Q And what I'm asking you is, does the occupational setting, who you see in an occupational setting, does that approximate the entire range or population subject to those kind of exposure levels?
A No. Actually, you know, workers tend to be younger; they tend to be fitter than the normal population, you know. So there's lots of reasons why you wouldn't see something in an occupational cohort that you would see in a non-occupational cohort just because of that.
Q And the existing OSHA standards, do you know when most of them were adopted?
A 1970. Actually, 1968.
Q And based on science that was developed when?
A Well, you know, prior to 1968.
Q So are you saying that most of them have not been changed since 1968?
A The vast majority of them have not been changed since then. A number of important ones have, but the vast majority have not.
Q To your knowledge, has either NO2 or PM2.5 been addressed by OSHA since then?

A Well, OSHA doesn't have exactly a PM2.5 standard. So it's hard to compare that directly, but the respirable dust standard is a generic standard, and their NO2 standards I don't think have been reevaluated since 1968.
Q And as a general principle, would an industrial hygienist say that the OSHA standards are acceptable now in terms of providing adequately for workers' safety?
A No. I think, as a general rule, you'd look at the breadth of exposure guidelines that you have available to you as a professional -- OSHA, the National Institute for Occupational Safety and Health, the ACGIH, there's European Union guidelines -- and you'd look at all those together and you'd probably pick the one you think was lowest and most defensible, and that's probably not going to be the OSHA standard for most things.
Q So are you saying that something like the ACGIH standard, is that the one that an industrial hygienist would normally look to in terms of determining --
MR. GOECKE: Objection. Leading.
MS. CORDRY: No.
MR. GROSSMAN: I'll sustain that objection.
MS. CORDRY: Okay.
MR. GROSSMAN: What is the standard; not, is that the standard.
MS. CORDRY: Well, I think he testified -- okay.

I am trying to ask specifically about that.
BY MS. CORDRY:
Q What is the standard an industrial hygienist in the United States would look at first in terms of trying to determine appropriate levels within a factory?
A So as I mentioned before, I'd look at all -- I'd look at OSHA, I'd look at the ACGIH TLV, and I'd look at the NIOSH recommended exposure limit, and I'd even look at the -- EPA has a toxicity database that has reference doses for susceptible people. So I'd look at all those values, and I'd come to some judgments about what I, what I think is appropriate for the type of workers that I'm trying to protect.
Q And would you, as a hygienist, would you want to look at the most recent standards?
A Most certainly I'd put more faith in the ones that are most recently done.
Q Okay. And as an industrial hygienist, if you were called in by management to advise on conditions in a facility, would you view your job as simply determining if it fell below --
MR. GOECKE: Objection. Leading.
MR. GROSSMAN: Well, no, no. Once again, you're leading. What would you view your job as; not, would you view your job as. You're putting words in the witness's

mouth.
MS. CORDRY: Okay. Well, but there's an awfully broad range of what you might do if you were called in as an industrial hygienist. I'm trying to get him to a particular --
MR. GROSSMAN: I understand, but --
MS. CORDRY: -- range here.
BY MS. CORDRY:
Q If you were called in as management to advise on conditions at a facility that had hazardous pollutants there, what would be your approach? How about that?
A So I'd look at the range of exposures, and I'd look at the ranges in susceptibilities. I'd look and see if there's any health complaints, if there's any kind of concern from the medical provider. I'd look at the range of exposure guidelines that are present. I'd look at the type of training that the workers have received, and I'd make some judgment about whether it's acceptable or not based on all that.
Q Assuming you were below the OSHA limit, would you consider that your job was done at that point?
A No.
MR. GOECKE: Objection. Leading.
MR. GROSSMAN: No, I don't think that's leading --
THE WITNESS: No.

MR. GROSSMAN: -- so I'll overrule that objection.
THE WITNESS: I would not.
MR. GROSSMAN: But he's already answered it.
THE WITNESS: Yeah. Just like the --
MR. GROSSMAN: At least five times. So --
THE WITNESS: -- just like the EPA standard, none of these guidelines or standards are fine lines between hazardous and non-hazardous. People can, people can be underexposed compared to ACGIH and still suffer and still have complaints. Right? And so that's why it's a guideline. It's a tool used in the hands of professionals to make judgments. You don't assume that just because you're magically above or below some number that you can or cannot have a health effect.
BY MS. CORDRY:
Q What I was getting at actually, the next question is, with that view in mind, is there a way you discuss with management how they should structure the facility and their operations, keeping those issues in --
MR. GROSSMAN: What relevance is that for me, what he discusses with management?
MS. CORDRY: Well, because you are in a role, in a sense, you are being asked to approve whether a facility should operate or not and the argument that's being made to you is, I am just under the level and that's okay, and I am

saying, in a similar field, you look at these things; you don't just say, am I just below the standard? You look at trying -- well, I was going to let him answer the question, but what do you do when you're trying to deal with public health and personal safety, and how do you --
MR. GROSSMAN: I know, but he's already answered numerous times what he would do in terms of analyzing the health --
MS. CORDRY: Well, I'm not talking --
MR. GROSSMAN: -- health effects.
MS. CORDRY: Well, I'm not talking about analyzing the health effects. I'm talking about then, as a practical matter, what's the next step, what do you tell management to do about that --
MR. GROSSMAN: All right.
MS. CORDRY: -- that was the question.
MR. GROSSMAN: Go ahead. As a practical matter, what's the next step? What do you tell management to do?
THE WITNESS: So clearly, if you think exposures are at the point where you're having health, overt kind of health effects or they're approaching guidelines if you have that, you tell them they need to reduce the exposures. But even in the absence of that, if there are steps you can take to kind of minimize exposures, you should always take advantage of those because we never know kind of when the

exposures are going to, are going to be lowered and when the guides are going to get lowered, and so it's kind of prudent to always look at opportunities to reduce your exposure.

If there's things you're doing that you don't have to do, you know, a worker who leans over a vat to stir it versus kind of standing off to the side to stir it, you tell him don't lean over the vat. You make sure they understand what they're exposed to, what the health effects are, and how to protect themselves and how to do their job in a way that's going to reduce their exposure. So even the, even the absent kind of a number that says this is a problem, you still sit down and look at what people are exposed to and how can they protect themselves a little bit better.

MR. GROSSMAN: Or what conditions you can set up to make it workable?

THE WITNESS: Yes.

BY MS. CORDRY:

Q The question is, do you try to use conditions to protect them from exposure, or is it your preference to not --

MR. GROSSMAN: I think he's already answered the question. So let's just move on.

MS. CORDRY: Well, I think it is an important point, do you try to reduce exposure or do you try to eliminate the exposure possibility to begin with, and that's

the question I was just going to ask him, which is --

MR. GROSSMAN: He answered the question. He's already answer the question. You've asked it in a number of different forms. He's answered the question. You would like the exposure to be lower, but you also look at other things that can be done to reduce on the job. He's answered the question.

MS. CORDRY: But I think his answer was going to be, if you have a chance, you eliminate the exposure, you don't try to just condition it, and that's the question you're not letting me ask him.

MR. GROSSMAN: Sure. Sure. If you have a chance to make a perfect world, you make it perfect. If I have a chance to make a perfect world, I'd make it perfect. If I don't --

MS. CORDRY: I understand.

MR. GROSSMAN: -- if I don't, then maybe I have conditions. It's not --

MS. CORDRY: I understand, but I --

MR. GROSSMAN: You're belaboring the obvious.

MS. CORDRY: Yes. Okay. That was just -- because I think there really is a question here. Okay. So I really was down to my last question before we got to this point.

BY MS. CORDRY:

Q I would like to ask you as a summation, in view of

all of your education and experience and the facts that you have looked at here with respect to the station, the studies you've looked at, put all of that together, what is your view as to whether this station presents inherent, I'm sorry, presents adverse health effects?

A So I do not believe that this station is going to be benign in terms of the health impacts of the people who live around it. I think it's inevitable that the type of source is going to produce pollutants that are going to raise people's exposures to levels that I think are within the range that the health literature suggests are hazardous, are dangerous. Hazardous is probably a difficult -- certainly they're going to increase morbidity for a variety of respiratory concerns, in particular.

So when I make that judgment, I'm not constrained by what the EPA standards are, you know. I make judgments about health, as a public health professional, based on obviously what the standards are but also what I think the literature suggests. And, you know, if someone would come to me and say is this, is this going to be a risk for me, and I wouldn't rely solely on whether I estimate whether it's above or below the standard. I'd certainly look and see whether I think there's health effects below the standard because I know they're five to 10 years behind already and I know the literature is suggesting that the

model is, the air pollution literature, the literature is five years ahead of the EPA regulations. The EPA regulations come down; they catch up, but they're always five years behind. And so I have no reason to expect that's not going to occur, and I think that there's going to be air pollution produced by this source, it's undeniable, and I think those levels are going to put the people around there at a greater risk for health effects than they are now.

MR. GROSSMAN: Okay.

MS. CORDRY: Okay. I have no further questions.

MR. GROSSMAN: All right. Before we take a little break, are there any questions from --

MS. ADELMAN: No, the Coalition has no questions.

MR. GROSSMAN: -- your, from the Coalition? No? How about from -- well, I don't see Ms. Duckett here.

MS. ADELMAN: No. She's --

MS. SAVAGE: She just left.

MR. GROSSMAN: Okay. So we won't take -- all right. So let's take a five-minute break, and then we'll proceed to the applicant's cross-examination.

(Whereupon, a brief recess was taken.)

MR. GROSSMAN: Been informed that there are no rooms available on February 26.

MR. GOECKE: Okay.

MS. ADELMAN: Okay.

MR. BRANN: Okay. So we're off the 26th.
MS. ADELMAN: Or you can come to my house.
MS. HARRIS: But I did learn that Mr. Guckert is available the 24th.
MR. GROSSMAN: Okay.
MS. HARRIS: So do we put that one back on?
MR. GROSSMAN: Yes. Well, I haven't, I haven't formally taken it off. So --
MS. HARRIS: Okay.
MR. GROSSMAN: So we're still on for the 24th and 25th. So we'll -- let me turn back to that.
MS. HARRIS: But with the caveat, obviously, that if Mr. Guckert finishes at 2 o'clock, we're not going to put Mr. Sullivan back on until the opponents have completed their case.
MR. GROSSMAN: Certainly.
MS. SAVAGE: Are we meeting on the 14th or no?
MR. GROSSMAN: We are keeping it on the calendar because it's quite possible that the 13th may be snowed out. There are a series of weather alerts that have just been issued --
MS. SAVAGE: Oh, really?
MR. GROSSMAN: -- they're expecting heavy snow.
MS. SAVAGE: Really?
MS. ADELMAN: So an inch.

MR. GROSSMAN: I wouldn't lie to you.
MS. HARRIS: Donna, you need to look at the Montgomery --
MR. GROSSMAN: I don't know. So --
MS. HARRIS: -- we'll follow the Montgomery County Schools.
MS. SAVAGE: Ah, okay. Right.
MR. GROSSMAN: Right. We're going to follow Montgomery County School. That's our published policy.
MS. SAVAGE: Yeah. Yeah. No, I know that, but --
MR. GROSSMAN: So --
MS. SAVAGE: -- I haven't seen the weather in 24 hours.
MR. GROSSMAN: So it's possible that we'll be delayed or whatever. So --
MS. SAVAGE: Aha.
MR. GROSSMAN: -- we'll keep the 14th on --
MS. SAVAGE: Okay.
MR. GROSSMAN: -- and if we are here on the 13th and we complete what needs to be completed, then we'll --
MS. SAVAGE: Okay.
MR. GROSSMAN: -- announce publicly that the 14th will be canceled.
MS. SAVAGE: Okay. Thank you.
MR. GROSSMAN: All right. So we're back on for

2/24 and 2/25.
MS. HARRIS: And then, Mr. Grossman, I had another procedural question.
MR. GROSSMAN: Yes.
MS. HARRIS: I'm trying to figure out the issue with rebuttal reports because, to the extent we're hearing information today or when Dr. Jison testifies and we're preparing reports in response to those, we may be up -- we may not be in compliance with the 10-day rule. So --
MR. GROSSMAN: Right.
MS. HARRIS: -- I'm not sure how we handle that.
MR. GROSSMAN: Well, let's, at this point, get them as fast as we can, but we want to keep the calendar. So I understand that. Rebuttal is often different from case-in-chief in terms of what has to be produced in a court setting, in any event. I mean, I'd like to in this kind of a case try to get the other side, as I've said, that 10 days' notice of anything, but to the extent that it can't be done and there's some kind of a report, as you suggest, in rebuttal -- I mean, rebuttal isn't necessarily a report. It may be a witness testifying. So that's --
MS. HARRIS: Yes, correct. Correct.
MR. GOECKE: Right.
MR. GROSSMAN: All right.
MS. HARRIS: Okay.

MR. GOECKE: But to the extent that Ms. Cordry has raised issues in her, quote/unquote, summary, and Dr. Breysse's testimony today goes greatly beyond the scope of his two letters that he submitted before, so we've got --
MR. GROSSMAN: Right. His letters were shorter.
MR. GOECKE: Yes.
MR. GROSSMAN: All right.
MS. CORDRY: As was Dr. Chase's.
MR. GROSSMAN: Yes, Dr. Chase's was even shorter.
MS. CORDRY: Everybody seemed to put in short letters and then have lots to say.
MR. SILVERMAN: Except the lawyers.
MR. GROSSMAN: All right. I just try to make sure I get as much information to the other side as possible, to be as fair as we can. All right. Are we ready to begin our cross-examination?
MR. GOECKE: We are.
MR. GROSSMAN: Mr. Goecke, it's all yours.
MR. GOECKE: Thank you.

CROSS-EXAMINATION

BY MR. GOECKE:
Q Good afternoon, Dr. Breysse. Can you tell us when you first got involved in this case?
A Probably over a year ago.
Q And how did it come about that you got involved in

this case?
A I got a phone call from a fellow who calls me on occasion to help with, give advice on environmental matters that -- in support of kind of community groups who don't have a lot of resources, and I'm blanking on his name.
MS. ADELMAN: Richard.
THE WITNESS: Sorry?
MS. CORDRY: Richard Klein.
MR. SILVERMAN: Klein.
MS. ADELMAN: Richard Klein.
THE WITNESS: Richard Klein, and Richard Klein --
MR. GROSSMAN: And as tempting as it is, let's try not to call out to the witness from the audience.
MS. CORDRY: Okay. Right.
MS. ADELMAN: Sorry.
THE WITNESS: And so I've helped, I've helped Richard with things over the years, and --
MR. GROSSMAN: If he doesn't remember, he'll just say he doesn't remember.
THE WITNESS: -- and he introduced the group to me.
BY MR. GOECKE:
Q And who is Richard Klein?
A He runs a company called Community/Environmental Defense Services, I believe is its name.

Q I'm sorry. Say that again.
A Community/Environmental Defense Services.
Q Community/Environmental Defense Services?
A Yes.
Q And do you know what that company does?
A It supports groups that have, community groups that have concerns about environmental matters. He does probably more broad stuff, but I -- he calls me if there's a question about something that has an air pollution focus.
Q Okay.
A So, for example, he put me in contact with the group for that Harford County case I did before.
Q And so does Mr. Klein's company provide consulting services for community organizations?
A I believe so.
Q Yes. And is this typically in situations where they're opposing a development?
A You know, I can't speak to what his typical consulting is. I only know when he gets me involved.
Q Yes. But is that the type of projects that you're aware that he works on? I mean, I know you don't know what's typical, but would that --
A It's typical for what he gets me involved with.
Q -- would that be included in what his --
A Yeah. It's typical for what he's gotten me

involved with.
Q Yes. And what happened after Mr. Klein contacted you?
A You know, I can't remember the details, but I -- he put me in touch with the, I believe with the Kensington Heights Civic Association and asked if I could kind of help them out.
Q And you testified that you don't do a lot of consulting work. Is it -- besides the work that you do through Mr. Klein, is there other consulting work that you do these days?
A What am I doing right now? I don't think I'm doing anything else.
Q Okay. So is it fair to say that most of your consulting work is on behalf of community organizations that are opposing a commercial project of some sort?
A No. In fact, I do this on rare occasions.
Q Okay. And what other type of consulting projects have you done lately that does not fit that description?
A So, for example, I spent four years consulting with the Hanford Concerns Council about exposures in the Hanford tank farms out in the state of Washington. I did some consulting -- I gave some advice to an attorney, but we didn't, we didn't get to the point of testifying, about popcorn lung, and the attorney represented a company that

made butter flavoring, and they were interested in how to protect themselves from lawsuits about, I don't know if you know what popcorn lung is, but workers --
Q No.
A -- workers who work at popcorn manufacturing facilities can get this horrible lung disease, and nowadays there's a lot of lawsuits.
MR. GROSSMAN: I never knew. What causes that?
THE WITNESS: Well, they think they know, but they're not sure. It's a chemical called diacetyl, I think. So it's artificial butter flavoring, but it's interesting because, when you eat it, it's safe; but, when you heat it up, when you make, when you make microwave popcorn, and because of vapor, you inhale it, it destroys your lungs.
BY MR. GOECKE:
Q Yes.
A So eating it is fine. Breathing it is bad.
MR. GROSSMAN: So you shouldn't microwave your popcorn?
THE WITNESS: Well, you know, there's a couple of papers that come out, suggesting that people who microwave popcorn a lot are probably at risk for this or might be at risk for this. So by a lot, I mean, they -- there's one case where somebody who microwaved about seven or eight bags of popcorn every day for like 25 years.

MS. HARRIS: Who died of malnutrition.
MR. GROSSMAN: Popcorn addict. All right.
THE WITNESS: But I think insurance, something. So that's, that's another example. So I pick and choose the consulting I do, mostly just for what kind of interests me and what I think I have the time to do, but I think this is a small fraction of what I do.
BY MR. GOECKE:
Q Okay. And when you got put in touch with the Kensington Heights Community Association, who there did you speak with?
A You know, I'm sorry. I'm not trying to obfuscate, but I don't keep those kind of records. I can't remember the details of it at all.
Q Yes. And do you remember what was asked of you to do on this case?
A So the initial case was asking me to kind of review some of the siting guidelines that the state of California produced for large service stations and to place this service station in context with those guidelines.
Q But you don't remember who asked you to do that?
A No.
Q Okay. And did you review the siting guidelines -- you're referring to the CARB guidelines, I take it?
A Yes. Yes.

Q And did you review the CARB guidelines and apply them to this situation?
A Well, we tried to as much as possible. This size service station is probably a little bit outside the CARB guidelines, but I attempted to kind of apply the CARB guidelines.
Q Yes. And you talked about that attempt to apply the CARB guidelines in your letters of March 5th, 2012, and February 22nd, 2013, is that correct?
A Yes.
Q Okay. And I noticed one difference between your March 5th, 2012, letter and the February 22nd, 2013, letter. The February 22nd, 2013, letter, which --
MR. GROSSMAN: I have the exhibit numbers. I don't know. So let's -- I'll mention that.
MR. GOECKE: Let's do it that way then.
MR. GROSSMAN: The February 22, 2013, is 88(a).
MR. GOECKE: Thank you.
MR. GROSSMAN: And the -- which one was the other one?
MR. GOECKE: The other one was --
MR. GROSSMAN: There's a March 5, 2012 --
MR. GOECKE: Correct.
MR. GROSSMAN: -- and then there's a -- the March 5, 2012, is 88(b), and then -- and I thought there was one

other, but --
MR. GOECKE: Was that the CV?
MR. GROSSMAN: Oh, yes, there was a March 25, 2013. I didn't have an exhibit number on that. I don't know what the exhibit number is on that one. Do you know, Ms. Cordry, what the exhibit number is on the March 25, 2013, letter that -- entitled, from Dr. Breysse, entitled Expert Opinion on Costco's Air Quality Assessment?
MS. CORDRY: I don't offhand. Let me see if I can figure it out as we go along here.
MR. GROSSMAN: All right. Well, while she's looking, checking on that, you can go ahead and question.
MR. GOECKE: Thank you.
BY MR. GOECKE:
Q Just one thing I wanted to clarify, the exhibit 88(a), February 22nd, 2013, letter, is on Johns Hopkins letterhead, but you're not here today as a representative of Johns Hopkins?
A I am not, yeah, yeah.
Q Okay. And why did you include a letter on Johns Hopkins letterhead?
A I probably did it from my office instead of from home.
Q And you said you attempted to apply the CARB siting guidelines to this situation but that, I don't want

to put words in your mouth, but you said it was difficult to do that?
A I'm sorry. Can I see my -- those two reports? Ms. Cordry, do we have copies of them or --
MS. CORDRY: I don't have copies of them right with me.
MR. GROSSMAN: I'll show you my copies.
MS. CORDRY: Okay, great.
MR. GROSSMAN: There were three of them that I have. One is February -- well, the first one was March 5, 2012, and that's 88(b), I think. Then there's a February 22, 2013, 88(a), and then there's one I didn't have an exhibit number for, for March 25, 2013. I might be able to locate an exhibit number. Let me see.
MS. HARRIS: Mr. Grossman, do you have an extra copy of the March 25th letter? I'm not so sure we have that.
MR. GROSSMAN: I don't have an --
MS. HARRIS: Okay.
MR. GROSSMAN: -- well, it's probably in the file --
MS. ADELMAN: Might be --
MR. GROSSMAN: -- if you want to look up -- the files are over there.
MS. ADELMAN: It might be similar to the one from

Planning Board.
MR. GROSSMAN: Yes, they're -- I don't think they were too dissimilar, but if you want to --
MS. ADELMAN: Yes.
MS. HARRIS: Okay.
THE WITNESS: So I think the issue was that the size of the facility that we're talking about here, the 12 billion gallons per year, was bigger than the facility that the CARB risk assessment was estimating. So I had to extrapolate to the bigger size, if I remember correctly.
BY MR. GOECKE:
Q Okay. In other words, the CARB guidelines didn't contemplate a distance that we have here?
A For this size facility.
Q For this size facility?
A Yes.
Q Yes.
MR. GROSSMAN: My guess is that the, just looking back at the dates here, that the March 25, 2013, letter might be Exhibit 96(c). It says: Opinion on Costco Air Quality Assessment by Dr. Patrick Breysse. So I'm --
MS. HARRIS: 96(c)?
MR. GROSSMAN: Yes. That's -- 96(c) is the March 25, 2013, one, I believe.
MR. GOECKE: Thank you.

BY MR. GOECKE:
Q And, Dr. Breysse, in your March 5th, 2012, letter, 88(b), on page 2 you stated that using the CARB assessment, we were able to estimate that the excess risk for a 12 MGPY, which I assume means million-gallon-per-year facility, at a distance of 100 meters is nearly three times higher than that recommended in the CARB Land Use Handbook. How did you calculate that risk assessment?
A So I said: Note, the CARB risk assessment did not extend beyond 100 meters; so we don't have to extrapolate beyond that distance. But I think we just did a linear extrapolation from the higher throughput, but I don't have my notes in front of me about this, the exact kind of -- the exact calculation.
Q So when you say that there is a three times higher risk than that recommended by CARB, you're talking about at a distance of 100 meters?
A Yes.
Q Okay. But you don't remember exactly how you calculated that?
A Correct.
MR. GROSSMAN: And you said 100 meters, not 100 feet or 100 yards, 100 meters?
MR. GOECKE: One hundred meters is what he says in his letter, that's right.

MR. GROSSMAN: Okay.
BY MR. GOECKE:
Q So did you perform a risk assessment for the Stephen Knolls School?
A No, I did not.
Q Okay. Or for the swimming pool?
A No.
Q For any of the residential homes?
A No.
Q And after you reviewed the CARB guidelines, what did you do next for this case?
A There was a hiatus where I probably didn't do much, and then at some point, I can't remember the exact, the exact dates, I was asked if I could kind of help provide some input into the broader air quality assessment associated with the gas station, which was the focus of --
Q Meaning what?
A -- focus of what I talked about today.
Q When were you asked to do that?
A I can't remember exactly.
Q Was it three months ago, six months ago, nine months ago?
A Well, I touch on it on my March 23rd letter. So it must have been somewhere around that time.
MR. GROSSMAN: That's what year?

THE WITNESS: March 25th, 2013.
MR. GROSSMAN: Okay.
BY MR. GOECKE:
Q Have you done anything on this matter since March 25th, 2013?
A I've had extensive discussions with Dr. Cordry and -- Ms. Cordry and other people and, obviously, kind of tried to place some of this in context with the research that I'm aware of, in the meantime, but no formal work product, such as these letters.
Q Okay. Have you reviewed any of the transcripts from these proceedings?
A A little bit but not much.
Q Which transcripts have you reviewed?
A I don't recall. I've received a -- I received a number of transcripts, but I don't recall exactly the ones that I reviewed.
Q Do you remember which witnesses you reviewed?
A I believe I reviewed some of Dr. Sullivan's testimony, but I didn't, I didn't focus on it in great detail. I probably focused on the bits where he critiqued my reports, but beyond that I don't think I did much.
Q Yes. For the portions of Mr. Sullivan's testimony that you reviewed, to the extent that you recall, did you disagree with anything that he testified, statements?

A Well, I think, you know, I agree with some of his characterization on what I did, but I disagree with others of it, absolutely.
Q In terms of what you did?
A Yeah.
Q Yes. And what do you disagree with in terms of his criticisms of your work?
A Well, I think, you know, doing a risk assessment is the right thing to do, but I would, I would apply the same standard that I talked about the modeling as well. Doing a risk assessment, coming up with a single number based on a single kind of exposure scenario, I think, creates an overly simplistic estimate of kind of what the cancer risk is.
I would like to have seen a more comprehensive risk assessment that looked at a more detailed exposure estimate, and I would have applied perhaps an uncertainty factor for the fact that the cancer rates that we use for risk assessments applies to adult cancer; in many cases, we have children here, and leukemia is a common childhood cancer. And so I think there's a lot -- more rigor, I think, could have applied to the risk assessment; although I agree that given that the screening concern that the CARB recommended suggested there may be a problem, taking it to the next level was the appropriate way to do, but similarly,

I think there's room for improvement in that risk assessment.
Q In whose risk assessment?
A In the Sullivan risk assessment.
Q Okay. And when you say that the risk assessment is the right thing to do, what do you mean?
A So provide a more quantitative kind of cancer risk. So the setback that the CARB came up with was based on kind of an estimate of what the cancer risk was. I don't think we could, we could, it's fair to just kind of use, extrapolate that directly and assume you're going to get the same cancer risk.
So I think looking at kind of what the benzene exposure might be to kids going to school, to kids swimming in the swimming pool and assessing their early-life exposures and coming up with a cancer risk is probably -- an individual cancer risk for this scenario is probably the appropriate approach to take.
Q Okay. And when you say it's not appropriate to extrapolate from, extrapolate from what?
A Well, I think, I think the approach of the CARB was kind of -- I think it suggested that there was a problem, and beyond that, doing an individual risk assessment is probably a more defensible way to go.
Q And so do I understand you correctly that it's not

appropriate to extrapolate from the CARB guidelines?
A I think it, I think it places you in a -- it places you in a ballpark. It suggests that there is a concern. It suggests that it's something you have to look at more closely.
Q Yes. What's your recollection of what the CARB guidelines advised in terms of siting schools near gas stations?
A You know, it's been a while since I looked at them. I'm not really prepared to kind of go into a lot of detail about that. I do know there's a whole new office at EPA now, looking at EPA school siting and the proximity of schools to industrial sources of pollution, including gas stations. So there's a lot of attention being given to this question at a national level as well as the state level in California.
Q Did you review any of Mr. Sullivan's environmental reports in this case?
A You know, I looked at them. I wouldn't say I reviewed them to the -- scrutinized them to the level that I'd call it like a comprehensive review.
Q So you reviewed them, but you did not scrutinize them?
A Correct.
Q Which ones did you review?

A I reviewed lots of stuff. I'm not prepared to kind of enumerate them right now. I have e-mails full of things.
Q Who e-mailed the reports to you?
A From a variety of people, but probably more recently from Ms. Cordry.
Q Did Ms. Cordry provide you with summaries of Mr. Sullivan's testimony?
A We've talked about it. I don't know if I've gotten the summaries of it.
Q She's provided you with oral summaries of his testimony?
A We've reviewed kind of what his reports are, what his conclusions were, similar to what we kind of, how we walked through it today, yes.
Q Yes. And so did you rely on her, the information she provided you to form your opinions in this case?
A No, you know, and hopefully I was clear that -- you know, I don't question the modeling. Right? I question the assumptions that go into the models and, as a result, kind of the answer that kind of comes out the other side, you know.
So the modeling approach is kind of one thing, and I believe the Kensington Association has somebody else who's kind of critiquing that more specifically, but from my

perspective, you know, I'm more of an applications kind of guy, and I use outputs from models to help inform my exposure studies, help inform decisions and stuff, and I like to see, I like to not get into where we are today, where, you know, one report changes one assumption, you get a different answer, change another assumption, because we can go through that forever because -- and then, you know, I could run those models, or I could get one of my students to run those models, and I could, I could change all the assumptions and come up with a different answer, and I don't think that gets us any closer to the truth, and I think that's, that's the problem I have with that approach, but it's not wrong per se.

Q That was going to be my next question. Can you cite to any EPA guideline that says that anything that Mr. Sullivan did was improper or that violated any guideline?

A So I think, I think if you look at the National Academy of Sciences report on risk assessment that has discussions about the role of models and stuff, they say very clearly in there that uncertainty, estimating what the uncertainty of any model output, any risk assessment output is a crucial part of a risk assessment. So it doesn't say that the model is wrong, but there are modeling approaches that allow you to estimate the uncertainty.

So when you say it's, I think it's 160 right here, it's 160 but, you know, with what kind of boundary, how -- so, obviously, if it's 160 and my model predicts that it's going to be a very narrow band, so it's going to be like 140 to 170, I'm more confident in that 160 than if the model predicts, well, it's 160 but it could have been anywhere from, you know, 100 to 250. I'm less confident in that.

So without that uncertainty estimate, it's hard to kind of place the confidence in that number -- although that central tendency of that number might be right, but how confident I am that that number is the right answer is harder, harder to kind of put my thumb on.

Q So are you saying that Mr. Sullivan should have identified the range in which the numbers could have come out?

A Yes.

Q Okay. And so that's your primary criticism of his reports?

A Yes.

Q Of his modeling, I should say.

A Yeah. Yeah.

Q Okay. Any other major criticisms?

A Well, I think you have to be careful cherry-picking assumptions, and I think that's part of that whole question. I think you can cherry-pick assumptions to

kind of get an answer, and you know, you never know whether that's somebody's approach or not, but you know, you have to, you're open for that criticism if you do it that way, and then you're open to somebody else cherry-picking another set of assumptions that kind of give you different kind of answers.

So I'd think you want to protect yourself from that, and how you protect yourself from that is by saying, well, I'm not cherry-picking, I have a range of assumptions here that I'm using and I have a range of outputs and I think the truth is somewhere in the middle.

Q Yes. Were you aware that Mr. Sullivan met with Dr. Cole ahead of time to talk about the protocols, what the modeling was going to involve?

A No.

Q If that in fact took place, would that address some of your concerns about not talking about the range of the expected results?

A I don't, I don't know if it would or wouldn't. Right? My bias is not to, not to do, for example, the worst-case kind of modeling as a starting point, for example, and if that's what they agreed upon, then I think that might have been maybe not a good decision early on. But I wasn't at those meetings, and I'm not prepared to comment on what the appropriateness of those discussions

were.

Q Yes.

MR. GROSSMAN: Let me stop for a second and ask you this question about that. So let's say somebody does a model and, instead of doing the kind of range of possibilities that you say, they assume the worst-case scenario. Is that, is that an incorrect way to approach it for something like this?

THE WITNESS: I guess -- I'm hesitating to characterize it as incorrect, right, but what it is, it's open to this -- the scrutiny that we have right now is that how do you know they're worst-case and what's your judgment they're worst-case, are you prepared to defend all those inputs that are worst-case, and if so, part of that scrutiny is, somebody says, well, I did it myself and I decided what's worst-case and I got a number that's different than yours because I have a different sense of what's worst-case. And now you have a question of saying, well, which expert has the best judgment of what's worse. I don't know the answer to that.

MR. GROSSMAN: Well, if I understood what you testified earlier, you said you would have had a range of assumptions and all of those model assumptions would have been run through the computer and so your results would have given you a range of possibilities.

THE WITNESS: Yes.
MR. GROSSMAN: But I guess, at some point, you have to choose the outside of that range of assumptions, right?
THE WITNESS: Yeah.
MR. GROSSMAN: So if you start out with that outside range of assumptions -- that is, the worst-case-scenario set of assumptions -- don't you satisfy the possibilities in a situation like this where you're trying to predict what is the --
THE WITNESS: So how do you know they're worst-case?
MR. GROSSMAN: In your best-case scenario, don't you pick out a worst-case --
THE WITNESS: Right. So, so --
MR. GROSSMAN: -- an end assumption, the bottom-line assumption? You told me you're going to use a lot of different assumptions to run your computer models and then put them all in there and then you're going to get an error bar of some kind --
THE WITNESS: Right.
MR. GROSSMAN: -- and it's going to have a top and a bottom. Well, the bottom, let's say, or the top, let's say, in terms of the amount of pollutants, is going to come from a worst-case assumption. So, at some point, you're

going to have to choose the worst-case assumption that you're going to use that will generate that top line.
THE WITNESS: But you don't always know what those combination of things produces that, that worst-case scenario in this case. But what's most important is not necessarily that you get the lowest number but you get an estimate of confidence in that number, right? And so --
MR. GROSSMAN: Right.
THE WITNESS: -- if I'm a policymaker now and I'm asked to make a decision about something I think is worst-case and I have a number that I'm pretty confident in versus a number that I'm very uncertain about, I'm going to think about that number and the safety factor or the protection factor that I might want to apply based on my understanding of just how, how certain I am of that number being kind of good or bad, and you can't do that uncertainty analysis as long as you just pick one set of parameters, you call them worst-case, you come up with one kind of estimate of what the concentration is going to be. I think you'd want to know how confident I am in that number. If I think it's 160 parts per billion but it really could be, I'm 95 percent confident it's somewhere between 100 and 300 parts per billion, right?
MR. GROSSMAN: Right.
THE WITNESS: I think you'd want to know that.

MR. GROSSMAN: I understand. I understand your point there. I'm just wondering, if you did do this range of studies, you take a range of assumptions and then you generate the kind of projection you're talking about, with a range of possibilities, and you throw out all the ones that are the best ones and you just leave the worst-case possibility and then you present that, wouldn't that -- and if that worst-case possibility would satisfy all the necessary conditions, doesn't that handle the situation?
THE WITNESS: I don't, I don't think it works that way because what you get now is you get a, you get a, you get a distribution of outputs --
MR. GROSSMAN: Right.
THE WITNESS: -- right, that's either going to be narrow or it's going to be broad and you might want to say I want to know what the -- to be protective, I'm going to say I don't want to know what the average output is going to be, I want to know what -- you know, 75 percent of the time I'm below some number. I'm going to want to pick some extreme value, just something towards the high end maybe to be kind of overprotective, and I can't go back once I say what combination of things gave me this 75th percentile value. I mean, I might be able to, but maybe you want to pick the 80th percentile; maybe you want to pick the 50th percentile value.

Up at that point, you have, as a decision maker, a series of values that you can look at and you can decide, you know, what's the closest to truth and how protective do I want to be in terms of how far out on the higher end or the lower end of that distribution I want to be. You can't do it otherwise.
MR. GROSSMAN: All right. Mr. Goecke.
BY MR. GOECKE:
Q But what's the difference between doing it sequentially and all up front?
A I guess, at the end of the day, if you do it sequentially enough, we're doing the same thing. The nice thing about this computer algorithm is you can set it to run -- it does it sequentially because it iterates it like hundreds of thousands of times to give you kind of this distribution. So by doing it iteratively by hand, that's, you know, you're approaching that method but it's not, you know, at the end of the day, it's not a very efficient way to do it.
Q Yes. And the analysis you're talking about, is that called the Monte Carlo analysis?
A Yes. That's a --
Q Okay.
A -- that's a program you can use to do that kind of distributional sampling.

Q Yes. And can you just explain for us -- actually, never mind. In the context of running one of these Monte Carlo-type analyses, is it fair to say that you're talking in the context of academic papers for the most part?
A I don't think so. You know, I think -- for decision making in general, I think it's considered, it's becoming considered the standard of practice, as far as I know.
Q Have you ever used that approach on behalf of any commercial client?
A You know, I don't do this kind of modeling on a consulting basis.
Q Yes. Are you aware of anyone who has ever done that approach on behalf of a commercial client?
A You know, that's not the circle I run. So I don't, I don't know that kind of work.
Q Does the EPA or MDE require that type of analysis?
A I think they're getting to expect it.
MR. GROSSMAN: Well, I guess that's not the question. Does it require it?
THE WITNESS: No, I don't think, I don't think there's anything written in a law that says it's required.
BY MR. GOECKE:
Q Yes. And it's not part of any permitting process, for example, that you're aware of?

A No.
Q You spoke before about, or Ms. Cordry asked you about, I should say, the correction in Mr. Sullivan's report about the background levels for one-hour NO2 levels. Do you remember when she asked you about that?
A Yes.
Q And are you aware that Mr. Sullivan prepared a revised report in August 2013 that used the 98-micrograms-per-cubic-meter background levels for the one-hour NO2 analysis?
A Can you show me that report? I want to --
MR. GROSSMAN: Yes. That was presented --
MS. CORDRY: Yes. That's --
MR. GROSSMAN: -- portions of it were presented to him in the course of direct.
MR. GOECKE: Right.
THE WITNESS: I want to make sure we're talking about the -- I'm not sure what I'm --
MR. GROSSMAN: Here's what was presented.
THE WITNESS: -- I'm not sure what I'm aware of. I'm aware of what we talked about today. Is it --
MR. GROSSMAN: Yes.
THE WITNESS: -- is it something different that you're talking about, or --
MS. CORDRY: No.

THE WITNESS: -- is this what we're aware of?
MS. CORDRY: What we're doing today.
MR. GROSSMAN: Here it is. It was Exhibit 255, because that's what you're talking about, right?
MR. GOECKE: That is correct.
MR. GROSSMAN: And these are the portions of it that were presented to you. This is the August 2013 report. Whoops, I'm sorry.
THE WITNESS: Yeah, I have that. Yeah, I have these, just --
MR. GROSSMAN: Okay.
THE WITNESS: -- I just wanted to make sure there wasn't something else I was -- another report you were referring to.
BY MR. GOECKE:
Q Well, no. This is, this is, these are portions of the report that I'm referring to, and I guess my question to you is, did you review, when did you first -- did you ever review this full report?
A You know, I looked at the reports --
Q Yes.
A -- as I said before.
Q All of them?
A Yeah.
Q Yes. And so is it fair to say, as with the other

reports, this is something that you reviewed but didn't give a lot of scrutiny to?
A You know, I looked at it from a, from a 10,000-foot level, like I said before. You know, if somebody asked me could you redo this analysis and could I repeat it, could I take it apart and redo it, I'd probably say I could probably put together a team of people, we could do that, but do I have the time to do that, do they have the resources for me to do that, the answer is no. So short of being asked to kind of take it apart in that level of detail, I didn't digest it, but to say I didn't review it is probably not fair.
Q Okay. What else did you do to prepare for your testimony in this case?
A Not a lot more.
Q You said earlier that a good modeler can come up with any number that you want him to come up with or want her to come up with. Are you implying that that's what happened in this situation?
A No, I'm not, but that's the criticism you leave yourself open to when you do it this way. That's the criticism you protect yourself against by doing it the other way. So my wife was a consultant for a long time, and she used to complain all the time that some clients would say, you know, we want to show this is safe, we want to show this

is bad, and then they spend all their time figuring out how do they get the numbers to say it's whatever they think their client wants to say, and that's not, that's not a good position to be in where you think you're open to that kind of criticism. And I think that's, that's the risk you have when you do it this way, but I'm not implying that that's Mr. Sullivan -- I have no, no knowledge of his intent in that regard.

Q You testified before that you agree with Mr. Bianca from MDE that the effect on gas stations -- the effect that gas stations have on nearby populations is not well studied or well understood?

A Correct.

Q Okay. And would you also agree that this is an evolving area of science?

A I think they're part of the two sides of the same coin.

Q Yes.

A Unfortunately, it's not evolving fast enough. You know, the literature review, I'm quite surprised as sparse as it is about this. You know, there's people investigating lots of things, but gas stations seem to have kind of gotten below people's radar, environmental health scientists like myself.

Q Why do you think that is?

A I don't know.

Q What do you define as an adverse health effect?

A That's a good question. So that can mean lots of things to different people --

MR. GROSSMAN: Right.

THE WITNESS: -- and so an adverse health effect, you know, there's, in the context of asthma, there's an increase in asthma symptoms. It could be cancer if you're kind of worried about cancer exposure. So it could be a range of things. I think the context is kind of what's crucial to kind of, I think, put more flesh on the backbones.

BY MR. GOECKE:

Q Yes. But the EPA standards aren't guaranteed to protect from all adverse health effects?

A No. There's no guarantees in anybody's world for that.

Q There's no way to establish that?

A Right, yeah.

Q Isn't it true that the EPA guidelines are supposed to include a margin of safety to protect sensitive populations?

A They try to, yes.

Q Yes. In fact, they're required to by law, aren't they?

A Yeah. Yeah.

Q Okay.

A Well, they're trying -- they're required to take sensitive populations into, into consideration when they do it. How they incorporate that margin of safety probably is up to the administrator in the exact way to kind of implement that. But they don't take, you know -- when the CASAC says it should be between 13 and 15, the CASAC has kind of incorporated kind of a sense of safety for sensitive populations, that the EPA doesn't, at that point, say, well, I'm going to take 13 and divide it by 10 as another margin of safety. So they incorporate that in different ways in their guidelines, but they are supposed to kind of make sure that there is -- comfortably safe as possible.

Q Yes. And the 13 to 15 standard, you just, those numbers are just hypotheticals, right?

A Yeah. Yeah. Yeah.

Q And the sensitive populations that the EPA is supposed to protect, that would include asthmatics?

A Yes.

Q And that would include people with COPD?

A When there's data, right? And so, you know, there's not a lot of air pollution data on people with COPD. So it's hard for the EPA to say I have a standard that's protective for people with COPD if there's no data that

really, no strong data that suggests kind of how do people with COPD react to air pollution. That's probably an area where they don't probably say a lot about COPD and air pollution because that, those data are emerging now.

Q Okay. So is it your contention that the EPA NAAQS for the one-hour NO2 standard does not protect people with COPD?

A I don't think it's protective, no.

Q Yes. And that's because there's not data out there to allow the EPA to establish a standard that would protect them?

A Back when they published their previous standard, but they're certainly looking at it now.

MR. GOECKE: I apologize.

BY MR. GOECKE:

Q Turning to the EPA's focus on monitoring locations in the roadways, what type of roadways are they talking about? Are these side streets? Are these highways?

A No, I think they're looking for the big roads. Right?

Q And when you say big roads, you mean, for example --

A Major, major arterials.

Q -- I-95?

A Yeah, freeways.

Q Yes. Yes. So wouldn't you expect the levels of emissions of NO2 and PM2.5 to be much higher at those types of arteries than --
A Right. In fact, the EPA estimates it's, you know, two to, you know, 70 percent times higher, 1.3 to two times higher at those locations than they think in the general area.
Q Yes. So if levels along major arteries are less than 100, for one-hour NO2, are less than 100 parts per billion, wouldn't you expect the levels at the proposed Costco gas station site to be below that?
A Unless there was something there that was adding to it, right, but normally -- you know, I don't, I don't -- you know, this is a complex kind of juxtaposition of intersections. So I guess I want to be careful. I don't know what to expect without the Costco service station there unless there's some modeling numbers, like we've talked about before, that shows kind of what the NO2 is going to be at that site.
Q Well, are you aware of anything that would increase the level of NO2 at this site to be comparable to a busy artery?
A Traffic, right? Cars and traffic and --
Q Okay. And what level of traffic would it have to be at this site to be, to produce a comparable level of NO2

to a freeway?
A Oh, I don't think, I don't think I, I don't think I know the answer to that question. I don't think I can say X number of vehicle miles. I don't think I know the answer to that question.
Q Yes. Earlier Ms. Cordry walked you through a series of excerpts from Mr. Sullivan's report showing isopleths with NO2 levels. Were you aware that those, that the NO2 shown on those figures and tables was actually NOx and not NO2?
A Yeah, I guess I hadn't thought of it that --
MS. CORDRY: Excuse me.
MR. GROSSMAN: Well, which, first of all, which tables --
MS. CORDRY: I don't think that is a fair characterization of --
MR. GROSSMAN: Well, hold on a second. We're going to find out.
MS. CORDRY: -- what these charts are saying.
MR. GROSSMAN: Which tables are you talking about?
MR. GOECKE: All of them.
MR. GROSSMAN: Well, they're labeled NO2.
MS. ADELMAN: Yes.
MR. GOECKE: Right.
MS. CORDRY: Right.

MR. GOECKE: They're labeled NO2, but Mr. Sullivan assumed for purposes of his modeling that all the NOx would be treated as NO2.
BY MR. GOECKE:
Q So I guess, I guess, so that's my question to you, Dr. Breysse. Did you know that that was one of the conservative assumptions that Mr. Sullivan applied in his modeling?
A I didn't pay that attention to that level of detail in the modeling, no.
Q So you did not know about that?
A Right.
Q And would you agree that if you did not assume that all the NOx -- if you did not treat all the NOx as NO2, that the levels would actually be lower?
MS. CORDRY: I think that's a hypothetical he's not in a position to answer.
MR. GROSSMAN: Well, hold on. He can say if he's not in a position to answer it. He'll answer that way if he's not.
MS. CORDRY: Well, I don't think he's been qualified as an expert on the chemical reactions of NO2 and NOx.
MR. GROSSMAN: But this is cross-examination and you asked him a lot about NO2. So he can certainly say if

he's not qualified.
THE WITNESS: Can you ask the question again?
BY MR. GOECKE:
Q Sure, if I can remember it. Would it be fair to say that if the, if we treated all the NOx as NO2, that that would actually be a higher level than the actual NO2 that would exist at the site?
A It's likely you're going to overestimate, yeah.
Q And do you know what percentage of overestimation that might be?
A No, I don't. I'm not ready to answer that.
MR. GROSSMAN: Mr. Goecke, I can't recall; so refresh my recollection. Did Mr. Sullivan assume NOx, all -- that all NOx was NO2 for all other reports, including the August 2013 report?
MR. GOECKE: I believe that's true, but Mr. Sullivan is here. If it would be permissible for him to respond?
MR. GROSSMAN: All right, Mr. Sullivan, go ahead.
MR. SULLIVAN: Yeah, Mr. Grossman, I did --
MR. GROSSMAN: You're still under oath, by the way.
MR. SULLIVAN: -- I did make that assumption, and when I testified on September 20th, I made the point that those numbers were high on that basis and, if we had

accounted for the percent out of the tailpipe, the numbers would have been four times lower.
MR. GROSSMAN: Okay.
MS. CORDRY: And can we also then put in Dr. Cole's testimony that he said, no, it would probably still be 100 percent and you can't make those assumptions? I mean --
MR. GROSSMAN: Well, his testimony is in. It's not that we're adding --
MS. CORDRY: Right, but --
MR. GROSSMAN: -- new testimony. I'm just asking somebody to refresh my recollection.
MS. CORDRY: Right, but I guess I'm just saying, if that is going to be put in as a hypothetical, the opposite hypothetical should also be in the record, as well, so that the witness is not confused about what the state of the evidence is.
MR. GOECKE: I think you get a chance to ask more questions.
MR. GROSSMAN: Well, you get a redirect --
THE WITNESS: I'm not, I'm not prepared to talk about the conversion between NOx and NO2 and what that may or may not mean in this, in this scenario.
MR. GROSSMAN: Okay.
BY MR. GOECKE:

Q Did you review any of Dr. Cole's testimony from these hearings?
A I skimmed through them, probably not the same detail, but I looked at them, yes.
Q Yes. Were you aware that Dr. Cole testified that the PM2.5 outside of the ring road area was not a significant level?
A Can you say that again? Was?
Q That was not of a significant level for exposure to the residential properties, the school, and the pool.
A I don't recall the exact details of Mr. Cole's --
MS. CORDRY: Could you show what -- could you tell us what page that is?
THE WITNESS: -- Dr. Cole's testimony. If you can show it to me, I'd be prepared to comment on it.
MR. GOECKE: I don't have a page cite.
MS. CORDRY: Well --
MR. GROSSMAN: You can, if you dispute it, you can certainly get that on redirect.
MS. CORDRY: Well, I've been asked to give page testimonies when I did it. I --
MR. GROSSMAN: I understand, and --
MS. CORDRY: Okay. So it's --
MR. GROSSMAN: -- but it is, it's cross-examination --

MS. CORDRY: I understand it's cross-examination, but --
MR. GROSSMAN: -- and if he's incorrect, you can certainly point it out. Even if you can't do it by the time of redirect today, you can put it in the record at the next hearing that, that he assumed something incorrectly. Okay.
BY MR. GOECKE:
Q Dr. Breysse, to your knowledge, does the EPA or MDE have any standards for evaluating the synergistic effect of NO2 and PM2.5 and other contaminants?
A No. As I've said today, they do not.
Q Yes. And so how would you propose that the Hearing Examiner take that into effect in this process?
A So I would look at studies that have combined levels of pollutants that are similar to the expected combined levels of pollutants here, and if I see a health effect from that combination, I would expect to see it here as well --
Q Yes.
A -- regardless of a standard that says this is the level or not. I think there's a weight-of-evidence approach you could take that's based on the published literature, independent of the presence or absence of an EPA standard.
Q Yes.
A Obviously, it's not my job. So that was -- that's

merely my suggestion.
Q I understand, but to your knowledge, the EPA or MDE have not undertaken that task to date?
A No.
Q Has any regulatory agency in the United States --
A They have not.
Q -- done something like that?
A They have not.
Q They have not?
A Yeah.
Q And that includes California?
A They're working on it. If it's going to be done first, it'll be done first in California.
Q Yes. Are you familiar at all with the permitting process, with MDE to build a facility that generates what's considered a major polluter or --
A No. I have to confess, I'm not familiar with that process.
Q Yes. You said earlier today that 850 feet from a source, the levels of NO2 would be 50 to 70 percent of what they were at the highest location, is that correct?
A I don't think we know exactly. I think, just based on kind of what the EPA administrator said she expects the spatial distribution to be, that seems like a reasonable range.

Q Yes. And so your basis is the EPA administrator's comment on that?
A Yeah, where she gave kind of ballpark estimates of kind of what the spatial relationship between a near-roadway exposure and exposures you might expect kind of in the average, kind of, typical area away from the roadway air --
Q Yes.
A -- obviously it's going to be site-specific.
Q Yes. Based on your understanding of the proposed Costco gas station, what do you think will be the most significant contributor of NO2 to the residential community?
A So it's going to be a combination of things. I don't think I know exactly kind of what the relative combination is going to be, but certainly the background is going to be a big part of it. The traffic in the, from the center itself is going to be a part of it. The service --
Q When you say the center itself, you mean the mall?
A Yeah. Yeah, the loading dock, all these things are going to be part of it. The queuing of the traffic at the service station is going to be part of it. I don't know if I can parse kind of exact source attributions to the different bits, however.
Q Yes. For example, you don't know what range of NO2 emissions might come from the ring road traffic to students at the Stephen Knolls School?

A Correct.
Q And so then it goes that you would not, also not be able to say how much the gas station traffic itself, as opposed to the general mall traffic, would contribute towards the Stephen Knolls School?
A Well, I guess we -- I go by the model data that, the Sullivan reports, that kind of attempt to estimate that for us. There's no other information I have available to me --
Q Yes.
A -- right? And this, this suggests that there's a, that there's a decreasing concentration and then there's this hot spot, is what they call it, and there's a ring of kind of an elevated concentration around this hot spot, suggesting that there is an elevated contribution due to that that's independent of the stuff that's around it. Now, whether that independent contribution adds, you know, significantly way above or way below, you know, the health threshold or not is probably part of the discussion. And the numbers, we can talk about the absolute value of the numbers, but it appears from these, these models that there's this hot spot there. So you can't deny that the service station is going to contribute something.
Q Yes. And what's a hot spot?
A A hot spot is a localized source of high air

pollution.
Q Is there a certain level that must be attained to qualify as a hot spot?
A No. No. It's a generic term that's used.
Q I'm not sure. Do you have a copy of Exhibit 255(a)? This is the one where --
A I have -- this one?
Q Yes.
A This is --
Q You just have a partial copy of that, right, not the full thing? Do you have page 8?
A No.
MR. GOECKE: Sorry. Indulgence.
MR. GROSSMAN: Sure.
MR. GOECKE: If I may approach and just show Dr. Breysse what I'm referring to?
MR. GROSSMAN: Absolutely.
MR. GOECKE: I apologize. I don't have extra copies.
BY MR. GOECKE:
Q But, Dr. Breysse, I'd like to show you Mr. Sullivan's report that's been marked as Exhibit 255(a) --
A Okay.
Q -- and this is the one that's dated August 16th,

2013. And on page 8 of that report, Table 2, he breaks down the different categories of contributions for exposure, and if we focus on the Stephen Knolls School, for example, the gas queue will contribute .21 micrograms per cubic meter. Do you consider that to be a significant emission?
A You know, I guess I don't know how to answer that question because, again, I'm not quite sure what these numbers mean and, you know, I haven't looked at detail about how they were developed and stuff. So I, I didn't, I didn't want to comment on specific modeling outputs and whether they were appropriate or not as much as I want to talk about the kind of general approach. So I'm going to refrain from commenting about specific modeling outputs other than that I know they're sensitive to all sorts of inputs.
Q Well, let me try it this way: At what level would the contribution from the gas station, in your view, be significant?
A That's a good question. I don't know the answer to that question. I think that's a question that has to be made kind of as a policy expert, but certainly, if it contributes to the background levels in a significant way, then it's probably something that needs to be considered.
Q Right, but if it, so --
A Yeah, I'm not going to give you a number and say if it's 50 percent or if it's 30 percent or it's 25 percent.

I don't know the answer to that question.
Q Fifty percent of background levels or 30 percent --
A Yeah, you know, if it's half or, you know, what's being -- I don't think we know the answer to kind of what's significant. I think that's part of what the Hearing Examiner needs to decide.
Q Okay. Because no one else has been able to determine it?
A Well, there's no magic number that says, you know, this amount is significant, this amount is not significant.
Q Yes. So the EPA has not set a significant impact level for NO2?
A I'm not sure what you mean by that.
Q In terms of evaluating a potential permit application, for example.
A Not that I know of.
Q What about for PM2.5?
A I'm not aware EPA sets levels for permitting for PM2.5 or NOx.
Q Yes. So you're not aware that the EPA has determined that anything below .3 micrograms per cubic meter for PM2.5 is considered insignificant?
MR. SILVERMAN: Objection.
THE WITNESS: I'd have to see the citation for

that.
MR. GROSSMAN: Mr. Silverman.
MR. SILVERMAN: I thought we had gotten rid of the SILs because they deal with major sources and --
MS. CORDRY: Exactly. I was going to raise the same objection that --
MR. SILVERMAN: -- and I mean, we use it when it's -- I mean, they introduced it, and then we sort of debunked it, and then you said, no, we're not going to use it.
MS. CORDRY: Now it's back again. So --
MR. SILVERMAN: Now it's back again, and Dr. Breysse did not testify about the standards that are used to determine whether there's a significant impact level for issuing a permit to a major source. He didn't -- that was not a part of his direct testimony. He was --
MR. GROSSMAN: Okay. So, first of all, let me take the last point first and that is the question of whether or not he testified about it. It's certainly within the ambit of his testimony to be cross-examined on the point.
As to the more particular question as to whether or not you can use SILs in this, I'm going to let him ask it as a cross-examination question, but I think it's appropriate to have the caveat added to it that it's been applied only to significant sources; in fact, that EPA, the

Sierra Club case said it, not very clearly, but that's what was in the -- that's the part of the statute they were referring to. So if you can rephrase your question to include that caveat, you may ask the question.
MR. GOECKE: I don't know if I can improve on the way, Mr. Grossman.
BY MR. GOECKE:
Q But in the context of major sources then --
A Do I?
Q Are you aware of the EPA establishing or what the significant impact level is in that context?
A I do not.
MS. CORDRY: And actually, I would object again because there is no current significant impact level. That was what was rejected by --
MR. GROSSMAN: That was what was stricken --
MR. SILVERMAN: That was stricken.
MS. CORDRY: Was stricken.
MR. SILVERMAN: That's what was stricken by the --
MR. GROSSMAN: -- by the U.S. Court of Appeals in D.C. Circuit.
MS. CORDRY: So I think it would be unfair to postulate a question that does not actually exist.
MR. GROSSMAN: I hear Mr. Sullivan shaking his head in the background, but we'll move along anyway.

MR. GOECKE: We will.
BY MR. GOECKE:
Q Turning back to Mr. Sullivan's reports, I believe you said earlier that Mr. Sullivan should have done modeling using both a rural and urban analysis, is that right?
A No, I don't think I said that.
Q Okay. Are you aware that he did do a rural and urban analysis?
A Yeah. I saw that in the reports, yeah.
Q Okay. So it's fair to say then that you haven't worked with anyone, or you haven't done any dispersion modeling before to show attainment with EPA National Ambient Air Quality Standards for an air quality permit?
A No.
Q Okay. In terms of background levels, you said earlier that it's been a huge success for EPA in terms of the decrease in ambient air levels for both NO2 and PM2.5, is that correct?
A Uh-huh.
Q What is the current background level in the Washington, D.C., area for PM2.5?
A I don't think I know the answer off my, top of my head.
Q Could you offer a range?
A No, I'd rather not.

Q If I said it was around 10.7 or 10.8, would you have any objection to that?
A I don't know what it is, but I certainly, you know, would hesitate to put, like, a decimal point on it regardless. I think that's implying probably a precision that doesn't exist.
Q Okay.
MR. GOECKE: Can we take a short break, Mr. Grossman?
MR. GROSSMAN: Yes. Let's take five minutes.
MR. GOECKE: Thank you.
(Whereupon, a brief recess was taken.)
MR. GROSSMAN: Okay. Back on the record.
MR. GOECKE: Back on.
MR. GROSSMAN: Mr. Goecke.
MR. GOECKE: We have no further questions, Your Honor, or Mr. Grossman.
MR. GROSSMAN: Okay. Any redirect?
MS. CORDRY: Maybe just a couple very quickly.
REDIRECT EXAMINATION
BY MS. CORDRY:
Q Is there a difference between picking conservative assumptions and picking the worst-case scenario?
A Well, I -- yes, they're different.
Q Right. So if someone picks conservative

assumptions, are those necessarily the worst case?
A Correct.
Q Okay. Well, correct or --
A They may or may not be the worst case.
Q Okay. If someone is doing a number of runs, would you expect he'd have fully comparable sets of data coming out of them that you could compare from one model to the next model?
A It'd make it easier to follow if that were the case.
Q Okay. So if you're only getting parts of data at different times in these different runs, does that raise a problem for you --
A I think it adds --
Q -- in terms of analyzing them, changes?
A It adds the complexity of kind of evaluating what it all means.
Q Okay. And I can see you're answering quickly because you want to get out of here. I know that and I'm working on that.
A Am I the only one?
Q No.
MR. SILVERMAN: No.
BY MS. CORDRY:
Q We're all getting there.

MR. GROSSMAN: Wait a minute. I thought you all liked it here. I came out from a visit with my grandchildren to be here with you all today.
MS. CORDRY: We are going very fast.
MR. BRANN: And we appreciate that very much.
MR. GROSSMAN: Thank you.
BY MS. CORDRY:
Q I think you had indicated you believed that the EPA, under its statute, was expected to set, tried to set standards with a margin of safety, correct?
A Yeah.
Q Is it also required not to overregulate, not to set them too strictly?
A I don't know how to answer that. Is it not --
Q In other --
A -- it's a double negative.
Q Is it required not to set the standards more strictly than necessary? Is that also part of the statutory mandate?
A I don't, I don't know exactly the answer to that question --
Q Okay.
A -- I don't think so, but I don't know.
Q Okay. I can point him to where in the rules it says that. So we'll deal with that. You were said -- you

were asked about that the EPA was looking at sort of big roads, and you mentioned arterials. Would you consider that Georgia Avenue, would you consider --
A Yeah.
Q That qualifies as one of the big roads you were talking about?
A Yeah.
Q So not just something the size of I-95?
A Right.
Q Okay. I think in the interest of letting you go, I have no further questions.
MR. GROSSMAN: Any recross?
MR. GOECKE: No.
MR. GROSSMAN: All right. Thank you very much, Dr. Breysse. I appreciate your coming down here and sharing your time with us. Have a great time in Nepal. You're not planning to climb Mount Everest or anything like that?
THE WITNESS: No. Unfortunately, this is in the low-land area; so we're miles, we're miles from the mountains.
MR. GROSSMAN: Okay. Well, have a safe trip. Thank you.
MS. CORDRY: We actually got you out in time for -- you can still do 5:30, sort of.
MR. GROSSMAN: Not at a terminal, though. All

right. Anything else that we need to --
MR. SILVERMAN: Mr. Grossman, yes. Yes.
MR. GROSSMAN: Mr. Silverman.
MR. SILVERMAN: Could we set a time to either brief or talk about this question of whether you can find, whether you can find a health effect risk absent a finding of a NAAQS violation? It seems to me it's a very basic question. I didn't want to take up the witness's time.
MR. GROSSMAN: I'm sorry. Say that again. I wasn't --
MR. SILVERMAN: Could we set a time or tell us how we could discuss the question of whether, assuming you don't find a NAAQS violation but you have credible evidence that there's a health issue anyway, how the Hearing Examiner ought to handle such a --
MR. GROSSMAN: Well, I think that's, that is part of the argument. I mean, the argument that Ms. Cordry has been making -- and it's been talked about off and on, one day or another here -- was whether or not I should impose some kind of, I don't want to say a standard, maybe it is a standard that is different from the EPA guidelines, and you can certainly, as part of the brief, argue that point --
MR. SILVERMAN: Well, I --
MR. GROSSMAN: -- and in your closing argument, if your side wants to make an oral closing argument, you can

make that pitch. It is an argumentative issue.
MR. SILVERMAN: Yes, I -- just the way you framed the issue, we don't want you to set a standard. That's not your job. We just want you to find facts about health.
MR. GROSSMAN: Okay. Well, however you want to phrase it. You can --
MR. SILVERMAN: Right.
MR. GROSSMAN: -- you can, the point is that you can say in the argument what you think my task is. If you think my task is to make a decision based on some amorphous health issue based on the zoning ordinance language and not apply a standard such as the EPA standard, you can make that argument. You're free to make the argument.
MS. CORDRY: And we will, Your Honor.
MR. GROSSMAN: Am I not addressing what your concern is?
MR. SILVERMAN: No, I --
MS. CORDRY: And we will.
MR. GROSSMAN: Right.
MS. CORDRY: Not phrased in perhaps exactly that way, but we will.
MR. SILVERMAN: Yes. Yes, I -- well, I hope in addition to making the argument, I hope we can have a discussion about this at some point. I don't just want to talk to you. I would like to --

MR. GROSSMAN: You want to beat me over the head with a stick.
MR. SILVERMAN: No, no. I'd like to have an exchange because I'm really trying to understand the zoning process and what you have to do, but --
MR. GROSSMAN: Well, this is an usual case. I'm not sure that this is, that a discussion with me over the zoning process is going to answer this question, but once again, when you raise it, if it's raised in oral argument -- I have had this discussion back and forth. I mean, I had it with Ms. Cordry. I've had it earlier in the case, probably with you.
MR. SILVERMAN: Yes.
MR. GROSSMAN: So we've had the discussion.
MR. SILVERMAN: Well, can I just ask one question? I really don't want to keep anybody.
MR. GROSSMAN: Sure.
MR. SILVERMAN: Okay.
MR. GROSSMAN: Everybody's anxious to stay anyway.
MR. SILVERMAN: Right. Yes. Well, you know, if --
MS. CORDRY: Well, I actually am staying. So --
MR. SILVERMAN: -- if we win on the health grounds, the newspapers will say Costco gas shown to be a health hazard, and if they win to accepting the report on

the health issue, it will say Costco gas shown not to be a health hazard or found not to be a health hazard. Would those be accurate?
MR. GROSSMAN: I am definitely not going to answer that.
MS. CORDRY: Even I don't like that question.
MR. SILVERMAN: Okay.
MR. GROSSMAN: I'm not going to concern myself at all with what the press coverage will be.
MR. SILVERMAN: Well, it's not just, it's not the press coverage; it's what the people understand.
MR. GROSSMAN: I can't approach my job that way. What I can do is try to carry out what I think is the intent of the zoning ordinance based on all of the evidence that I receive here after giving what I hope is a very fair hearing to everybody. So that's my job. I'm not going to try to cogitate what all the possibilities are of how people will receive whatever I conclude. I'm going to try to carry out the intent of the zoning ordinance. That's all I can do.
MR. SILVERMAN: Well, to be brief on that, thank you so much.
MR. GROSSMAN: All right. Thank you. Sure.
MS. HARRIS: Mr. Grossman, just one question.
MR. GROSSMAN: Yes.
MS. HARRIS: Are we, on the 13th or the 14th,

whatever the date may be, are we going to start with Donna Savage? Is that --
MS. CORDRY: I believe so, yes.
MR. GROSSMAN: Ah, that's a good question.
MS. CORDRY: Yes, I think --
MR. GROSSMAN: Okay.
MS. ADELMAN: Well, we might have at least two individual witnesses.
MR. GROSSMAN: Right, and --
MS. CORDRY: How long do you expect either one of them to be?
MS. ADELMAN: Oh, five, 10 minutes.
MR. GROSSMAN: So I'm glad you raised that. So let's talk for a second about who we have as --
MS. SAVAGE: Yeah, get them out of the way.
MS. CORDRY: Yes, it might be simpler, yes, to get --
MR. GROSSMAN: Get them out of the way?
MS. CORDRY: -- so that those people don't keep asking and asking and asking about coming back.
MR. GROSSMAN: All right. So let's see who we have.
MS. ADELMAN: Well, I don't know about Mr. Sims now because he was scheduled for today and I'll have to talk with him, but right now I have Ms. Houseworth and

Ms. Statland.
MR. GROSSMAN: Well, I did let him or you know, as to any of these witnesses, that they wouldn't necessarily get on today or when they wanted to be on because we --
MS. ADELMAN: Oh, indeed, yes --
MR. GROSSMAN: Okay.
MS. ADELMAN: -- but I rang him to say --
MR. GROSSMAN: Okay.
MS. ADELMAN: -- it wouldn't happened today, and --
MR. GROSSMAN: Okay.
MS. ADELMAN: -- he had indicated that today was the best day for him. So --
MR. GROSSMAN: Okay.
MS. ADELMAN: -- I don't know where he stands for --
MR. GROSSMAN: All right. So Ms. Houseworth, you said, and Ms. Sims --
MS. ADELMAN: No.
MR. GROSSMAN: -- maybe?
MS. ADELMAN: Ms. Houseworth and Ms. Statland will be --
MS. CORDRY: Mr. Sims.
MS. ADELMAN: Mr. Sims is a question.
MR. GROSSMAN: Right.

MS. CORDRY: Right. But, yes, I think it probably makes sense to bring those two, if they're both available then --
MS. ADELMAN: Yes, they are.
MS. CORDRY: -- in and out quickly so we don't keep worrying about them.
MR. GROSSMAN: And then Ms. Savage?
MS. CORDRY: And Ms. Savage. I think Ms. Holland would be, is expected to be on the 13th and -- my third-hand hearsayer. So I believe that she is nothing like the length of Dr. Breysse, but I think she is a, not a five- or 10-minute witness. I think she's a -- she's got a fair amount to say, I gather. So --
MS. HARRIS: What's a fair amount? I mean, is she an hour? Is she two hours?
MS. ADELMAN: I mean, she could be an hour.
MS. CORDRY: I'm thinking an hour-ish probably.
MS. HARRIS: If we could have a reminder that she needs to be submitting something in writing.
MS. CORDRY: Yes. I will check with Michele tonight and make sure --
MR. GROSSMAN: Well, I told you I can't require that, but I'm saying I asked her to do -- I asked Ms. Rosenfeld to tell her that, to ask her to do that because I think it would be fair, it would be help to

fairness aspect of it --
MS. HARRIS: Right.
MR. GROSSMAN: -- but I have to follow the code.
MS. CORDRY: And besides, I think it's helpful to make anybody have to do an outline of what they're going to say before they get on there.
MR. GROSSMAN: Good point. All right. So that's, that's our agenda for the 13th if we don't have, if we're not snowed out --
MS. CORDRY: Right.
MR. GROSSMAN: -- Donna Savage, Ms. Houseworth, Statland, possibly Mr. Sims, and Ms. Holland.
MS. CORDRY: Yes.
MR. GROSSMAN: Anybody else on the agenda?
MS. ADELMAN: Right. So we'll start with my two witnesses, who will be short --
MR. GROSSMAN: That's fine.
MS. ADELMAN: -- at 9:30 or 10 o'clock or something like that.
MS. CORDRY: 9:30, yes.
MR. GROSSMAN: Well, whenever, assuming, if we're not postponed, whatever --
MS. ADELMAN: Right. I mean, I'm going to ask them to be here the first thing in the morning.
MR. GROSSMAN: -- but let them know about, to

check Montgomery County Schools, because that's --
MS. ADELMAN: Oh, I will do that.
MS. CORDRY: Yes.
MR. GROSSMAN: -- we don't want them to show up here.
MS. ADELMAN: No, no.
MS. CORDRY: I'm so ready for a snow day myself.
MS. SAVAGE: For the two-hour --
MS. ADELMAN: Is that for Thursday, the snow, or is it Friday?
MR. GROSSMAN: Well, the snow is expected to begin Wednesday evening, I believe --
MS. ADELMAN: Oh, is it really?
MR. GROSSMAN: -- and, well, the last one I saw said heavy snow, but I don't know what they consider heavy.
MR. GOECKE: What's big?
MR. BRANN: All day Thursday is what I've heard.
MS. CORDRY: Ooh, yea, I can stay home, sleep in late.
MR. GROSSMAN: My wife will not be enthused about this, even though she'll get off from school.
MS. HARRIS: My children will be.
MR. SULLIVAN: We're sometimes wrong, but the forecast --
MS. CORDRY: That includes me.

MS ADELMAN: You're sometimes wrong?
MS. SAVAGE: Sometimes wrong?
MS. ADELMAN: Sometimes wrong?
MR. GROSSMAN: They've been remarkable -- I got to give credit to you meteorologists. I think that the weather people have been remarkably good in the last couple years.
MR. SULLIVAN: Yeah, we are. We're getting better.
MS. CORDRY: So you're taking full responsibility for all accurate weather forecasts?
MR. SULLIVAN: No, I'm not.
MR. GROSSMAN: Ms. Savage.
MS. CORDRY: And the bad is not your fault?
MR. SULLIVAN: It's not my fault either way.
MS. SAVAGE: So if the schools are on a two-hour delay, that means we start at 11:30?
MR. GROSSMAN: Yes. We'll be on --
MS. SAVAGE: Okay.
MR. GROSSMAN: -- we're going to follow the schools exactly --
MS. SAVAGE: Right.
MR. GROSSMAN: -- in this type of case. That's --
MS. SAVAGE: Okay. Okay, even though we start later than the schools anyway, but okay, I just want to make sure.

MS. CORDRY: Yes, I think that was actually the question. They would usually start at what, 8:00 or 8:30?
MR. GROSSMAN: Oh, that's a good point.
MS. CORDRY: So a two-hour delay would put them at what?
MR. SILVERMAN: 10:00, 10:30.
MS. CORDRY: Anybody got any kids in school?
MR. GROSSMAN: Oh, yes, that's a good point. I hadn't thought about that.
MR. SILVERMAN: They start at 10 o'clock if it's a two-hour delay.
MS. SAVAGE: What time should we show up if it's a two-hour delay?
MR. GROSSMAN: All right. I hadn't even thought about it that way.
MS. SAVAGE: Okay. It doesn't say on your website. It just says, you know, it says --
MR. GROSSMAN: We follow the schools, right.
MS. SAVAGE: We follow the schools or --
MR. GROSSMAN: Okay. We need to --
MS. SAVAGE: -- a two-hour delay is a two-hour delay.
MR. GROSSMAN: That's a good point. Yes.
MS. HARRIS: And given that we're crunched for time, why don't we say 10:00, because schools would start by

10:00, right?
MR. SILVERMAN: Yes, that's right.
MS. HARRIS: Is that acceptable?
MR. GROSSMAN: So do we want to say that?
MS. ADELMAN: So it'll be if there's a two-hour delay, we'll meet at 10:00.
MR. GROSSMAN: Of course, the other aspect of this is, well, regardless of what the schools do, if there really is a heavy snow, I may not be able to get out of my neighborhood. So you may have to start without me.
MS. SAVAGE: Oh, yes, neither would we.
MR. GROSSMAN: So --
MS. ADELMAN: Well, I can take your place.
MR. GROSSMAN: I'm sure you could. Ellen has already volunteered to --
MR. GOECKE: No. We'll come get you.
MR. GROSSMAN: -- Ellen, in my office, has offered to take my place and whip you all into shape.
MS. SAVAGE: Okay. That's cool.
MS. CORDRY: All right. So we will say that a two-hour delay means that we are operating on a school schedule of 8:00, 10:00.
MR. GROSSMAN: Why don't we do this. Let's do this: If they say a two-hour delay, let's make it 10:30.
MS. CORDRY: Okay.

MR. GROSSMAN: Okay?
MS. ADELMAN: 10:30? Okay.
MS. CORDRY: All right.
MS. SAVAGE: Yes, good idea, compromise.
MR. GROSSMAN: So a two-hour delay is 10:30 --
MS. SAVAGE: Okay.
MR. GROSSMAN: -- and we'll go from there, anything that -- any variation. Usually they don't do a variation on that. I mean, if it's -- either it's a two-hour delay or no school.
MS. CORDRY: Right, I think that's pretty much it. If it's not going to be two hours, forget it.
MR. SILVERMAN: Or they don't do it, yes.
MS. CORDRY: They don't get any work out of kids on a two-hour-delay day anyway. My recollection of my childhood was we didn't do anything on those days anyway.
MR. GROSSMAN: The other thing I would try to do is, you know, if you need to, I mean, if you have a central point that we can contact, I'll give you a call. So maybe if you want to give me a telephone number that I can reach you all on that morning, I'll call you and, at least the main characters, and you can spread the word. So, Ms. Harris, do you have a telephone number I can --
(Whereupon, at 5:37 p.m., the hearing was adjourned.)

C E R T I F I C A T E

DEPOSITION SERVICES, INC., hereby certifies that the attached pages represent an accurate transcript of the electronic sound recording of the proceedings before the Office of Zoning and Administrative Hearings for Montgomery County in the matter of:

Petition of Costco Wholesale Corporation
Special Exception No. S-2863
OZAH No. 13-12

By:

Wendy Campos, Transcriber

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