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 December 5, 2013, commencing at 9:42 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

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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 22nd day of a public hearing in the matter of Costco Wholesale Corporation, Board of Appeals No. S-2863, OZAH No. 13-12, 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. That's 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 we've had, as I say, we already had 21 other sessions. It was noticed to resume again today, and the next session has been noticed for Friday, that is tomorrow, December 6, 2013, here in the second floor hearing room of the Council Office Building at 9:30 a.m.

This hearing is conducted on behalf of the Board of Appeals. My name is Martin Grossman. I'm the Hearing Examiner, 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: Erich Brann for Costco.

MR. GROSSMAN: 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. ROSENFELD: Michele Rosenfeld for Kensington Heights --

MR. GROSSMAN: Ms. Rosenfeld.

MS. ROSENFELD: -- Civic Association. I'd like to note for the record that Karen Cordry cannot be here today, she has a conflict for work; and Eleanor Duckett will not be here today, she has some chronic hip and back problems that are not helped by these chairs; and Donna Savage will not be here today because her mother passed away earlier this week.

MR. GROSSMAN: Oh, I'm sorry to hear that. Well, I'm sorry to hear that the others are not here also, but I'm sure your organization is ably represented by you being here.

MS. ROSENFELD: Thank you.

MR. SILVERMAN: Good morning, sir. Larry Silverman for the Coalition, Stop Costco Gas.

MS. ADELMAN: Good morning, Mr. Grossman. Abigail Adelman for Stop Costco Gas Coalition.

MR. GROSSMAN: Good morning. Dr. Adelman.

MR. ADELMAN: Good morning, Mr. Grossman. Dr. Mark Adelman for the Coalition.
MR. GROSSMAN: All right. And I see that Dr. Cole has already assumed the seat of honor. Do we have anybody else in the audience who is here to testify today?
(No audible response.)
MR. GROSSMAN: No. Okay. All right. Then let me mention a few preliminary matters. Since our last session, we've had additional exhibits, 400 through, I think to 403 unless I'm mistaken -- make sure that the exhibit list I have is the up-to-date one. Ah, there's a 404 too. Okay. So let's go through those: 400, an e-mail between Dr. Adelman, or from Dr. Adelman to me, transmitting files with more descriptive names; 401 was an e-mail on November 25 between Pat Harris and Michele Rosenfeld regarding witnesses for the hearings today and tomorrow; 402, e-mail from Ms. Rosenfeld with questions from Dr. Cole re Mr. Sullivan's testimony; 403, an e-mail from Dr. Adelman to Mark Lewis DeGrace regarding -- I hope I'm pronouncing his name correctly -- regarding vehicle counts; and 404, an e-mail from Ms. Rosenfeld with copies of items that Dr. Cole plans to reference during his testimony.
Okay. All right. Witnesses scheduled for today are Dr. Cole, Mark Meszaros, if we can fit him in, of the Kenmont Swim Club, with a backup of Mrs. Adelman. Do we

have any agreement on future dates? I've watched the back-and-forth; so, unfortunately, seems to be few dates that are available to all parties in January. I would love to be able to complete this case in January as it has been some time since we started, on April 26th.
MS. ROSENFELD: Mr. Grossman --
MR. GROSSMAN: Yes.
MS. ROSENFELD: -- Dr. Breysse is available on the 10th which I understand is not a date that's available, and after that he's going on several trips out of the country and is unavailable again until the 13th and 14th of February.
MR. GROSSMAN: The 10th is a date available for me.
MS. HARRIS: Our point was that either the 9th or the 10th, we cannot do both. So if he is available on the 10th, we can be available the 10th but not the 9th.
MS. ROSENFELD: Okay. He was --
MR. GROSSMAN: So let's do the 10th, which is --
MS. ROSENFELD: -- he was looking. But Maria Jison is only available on the 9th. We've been trying to -- our experts have been holding dates and holding dates.
MR. GROSSMAN: As opposed to dating.
MS. ROSENFELD: As opposed to dating. I'd like to put this out as a possible suggestion.

MR. GROSSMAN: Okay.
MS. ROSENFELD: The last half of February seems to be relatively open for everybody, including our experts, and I was thinking perhaps we could schedule two days the week of the 13th and 14th and two days the following week and two days the following week, which should be more than an ample number of dates, I would hope, to finish, and we can just sequentially move through and --
MR. GROSSMAN: Do you have a preference on the 9th versus the 10th?
MR. GOECKE: No.
MR. GROSSMAN: I mean, I personally prefer to do it on a Friday rather than a Thursday --
MR. GOECKE: That's fine.
MR. GROSSMAN: -- because I have other obligations on Thursday morning, but I can modify them as need be. So if the 10th is as convenient, why don't we get one of the witnesses in. You said Dr. Breysse was the one available on the 10th?
MS. ROSENFELD: He was hoping he could juggle his schedule to make that work. He knew he couldn't make the 9th work.
MR. GROSSMAN: Okay.
MS. ROSENFELD: Ms. Cordry is the one who's been coordinating his calendar; so I will check with her and see

if he can confirm that.
MR. GROSSMAN: All right.
MS. ROSENFELD: So the 10th would be preferable. And then Ms. Jison is available later in the month of February, and I'll have to check her dates.
MS. HARRIS: It sounded like January 27th and 29th were available, I believe. Is that, at least --
MR. GROSSMAN: What about that?
MS. ROSENFELD: Dr. Breysse is not available for any of those dates.
MS. HARRIS: No, but --
MR. GROSSMAN: No, but if Dr. Breysse were doing it on January 10th, what about Dr. Jison for the --
MS. ROSENFELD: I will check with her.
MR. GROSSMAN: Okay. I mean, for us, I mean, we're, since we have other rooms usually we can get in this building if we know far enough in advance, it's not a problem with our schedule. We can undoubtedly provide a room any time. It's nice to be able to be in this room because it's more convenient, but if we have dates that everybody can agree to, even if we have a conflict on our calendar here, we would, you know, we would try to accommodate that, we would check it out.
So let's, if we can fit everybody in in January and finish this up, that would be -- ideal is probably not a

word I should apply to the progress of the case -- but it would be better. So --
MS. HARRIS: Based on my calculation of the dates, if we were to take the 10th and then the 27th and 29th, it still looks like we will need one date in February --
MR. GROSSMAN: All right.
MS. HARRIS: -- and I believe people indicated that the 3rd and 4th are available.
MR. GROSSMAN: When do you think, Ms. Rosenfeld, when do you think that you would find out about the availability of your witnesses? So what I'm going to suggest is that you folks have a conference call with each other or, if need be, just you and Ms. Harris or Mr. Goecke and try to work out dates rather than e-mail exchanges. I think that would be more efficient.
MS. ROSENFELD: Well, if I can reach Dr. Jison and Breysse today by e-mail, I might be able to confirm them by the end of the day if we can do that.
MR. GROSSMAN: Okay. All right. Then just --
MS. ROSENFELD: The other witnesses I think are flexible enough that we can work around them. It's their two schedules. They both --
MR. GROSSMAN: All right.
MS. ROSENFELD: -- are, you know, booked with other obligations.

MR. GROSSMAN: You can subpoena them. But, in any event, let's try to do it, let's try to squeeze as many dates as the parties can agree to in January, and you know, if not, we'll have some in February. And just let me know what the dates are, and then we'll check out, if the room is occupied those dates -- such as Wednesdays, the Board of Appeals always has it -- we'll see if the seventh floor room is available first and then after that the wonderful auditorium downstairs. So --
MS. HARRIS: We'll come full circle.
MR. GROSSMAN: Right. Okay. So try to get back to me by the latest early next week. All right. Any other preliminary matters?
MS. HARRIS: We had distributed by Dropbox the Phase I, and I have a physical copy that I can provide for you --
MR. GROSSMAN: Okay.
MS. HARRIS: -- either now or at a break is fine.
MR. GROSSMAN: All right. Let's just, let's wait until we --
MS. HARRIS: Okay.
MR. GROSSMAN: -- go through the preliminary matters. Any other preliminary matters?
(No audible response.)
MR. GROSSMAN: Hearing none, okay, do you want

to --
MS. HARRIS: Certainly.
MR. GROSSMAN: -- give me the -- that'll be Exhibit 405 and that's the Phase I, and if I remember correctly from looking at the electronic copy, it's essentially, this was pre-building the warehouse; this was the study of the area prior to the Costco warehouse being built.
MS. HARRIS: But it also included --
MR. GROSSMAN: Included the site area --
MS. HARRIS: Yes.
MR. GROSSMAN: -- as well, but it was prior to --
MS. HARRIS: Correct.
MR. GROSSMAN: -- the construction of the warehouse. Right. Okay. That's a fat old exhibit, I'll give you that. All right. So -- it's a good thing I've been going to my rehab so I can lift it. By the way, I do have to leave today for rehab at 4:45; so -- all right. So this will be Exhibit 405, Phase I study of environment on the site, dated 1/15/2010. I didn't, in my quick review of this study, I didn't see anything that was that exciting. Did anybody else? Are there some areas of the study that I should be paying particular attention to?
(Exhibit No. 405 was marked for identification.)

MR. SILVERMAN: I can't answer that question yet, but I -- it was more than I wished for.
MR. GROSSMAN: Yes, they are --
MR. SILVERMAN: Yes.
MR. GROSSMAN: -- these exhibits often are.
MR. SILVERMAN: Yes, so -- but I'll advise you probably tomorrow.
MR. GROSSMAN: All right. Okay. Then are we ready to proceed with our first witness?
MS. ROSENFELD: Yes, we are.
MR. GROSSMAN: All right. I take it that's Dr. Henry Cole. Would you --
MR. COLE: Good morning.
MR. GROSSMAN: -- state your full name and address for the record, please?
MR. COLE: Yes. It's Dr. Henry Cole, Henry S. Cole. You want my address?
MR. GROSSMAN: Please.
MR. COLE: It's 11229 Mattaponi Avenue, or Road, Upper Marlboro, Maryland 20772. I will spell Mattaponi: M-A-T-T-A-P-O-N-I. Some people call it Mattaponi; others, Mattaponi. Take your pick.
MR. GROSSMAN: How about Mattaponi? Just another possibility. Would you raise your right hand, please?
MR. COLE: Okay.

(Witness sworn.)
MR. GROSSMAN: All right. You may proceed.
MS. ROSENFELD: Thank you.
DIRECT EXAMINATION
BY MS. ROSENFELD:
Q Good morning, Dr. Cole.
A Good morning.
Q Would you please explain to the Hearing Examiner your academic background, please?
A Yes. Back -- a long time ago, I went to Rutgers University. I was enrolled at the College of Agriculture. My curriculum was preparation for research. And I chose the College of Agriculture because it was a perfect place for my interest in earth science, particularly soils, drilling things in soil, but also meteorology and that was a place where they had both -- all of those interests I could do under the preparation-for-research curriculum. So my joint majors or my two majors were soil science and meteorology.
MR. GROSSMAN: Okay.
THE WITNESS: I then went to the University of Wisconsin at Madison where I earned my Ph.D. in meteorology. I was there from 1965 to 1969. My dissertation involved climate change; however, to get through the Ph.D. exams, you have to have a full background in meteorology. And so my training involves dynamic meteorology, which is the study of

movement; thermodynamics, which is the study of energy in the atmosphere; micrometeorology, which is what happens near the ground and in smaller places, such as a mall and its surroundings; physical meteorology, which has to do a lot with the physical characteristics of the atmosphere, including the particles in the atmosphere. And my major professor was Reid Bryson, the late Reid Bryson. He was quite well-known in the field of climate change. His focus was particulates in the atmosphere and their ability to either reflect or absorb solar radiation and long-wave radiation, in other words, the radiation that the earth gives off.
I started to get very interested in air pollution as a result of those experiences. It was, 1969 was a time of great interest in the environment, and I happened to live -- when I moved to Racine, Wisconsin, to take a faculty job at the University of Wisconsin-Parkside, which is in neighboring Kenosha, I happened to live in a very air-polluted area, and I soon learned that Lake Michigan had a profound effect -- in fact, I lived right on the lake -- it had a profound effect on the meteorology and on the dispersion of air pollution.
MR. GROSSMAN: And on snow.
THE WITNESS: And what?
MR. GROSSMAN: And on snow.

THE WITNESS: Yes, it does, yes, absolutely.
MR. GROSSMAN: Okay. But let's move along to what's directly affected here.
THE WITNESS: Okay. I'm trying to connect the dots --
MR. GROSSMAN: Okay.
THE WITNESS: -- so that you'll see all of the areas that have sort of gotten me to where I am now. Okay. So, so I got my Ph.D. I, as I said, I then accepted a position at Parkside, which was a new campus at the time, and taught environmental earth sciences and atmospheric sciences -- meteorology, air pollution meteorology -- even a geology course. At the same time, I did three things that are of note to this case. One is, as I said, I got very interested in the lake effect on pollution, and the lake breeze, for example, has a tremendous influence in circulating pollutants. There's also a boundary between the lake, which in the summertime is cold relative to the land, and that sets up -- and there's also differences in the roughness of smooth water versus a rougher land surface -- so all of this, it comes into play in the area of modeling and air pollution meteorology.
I partnered with a meteorologist named Walter Lyons, who was, conveniently was at the University of Wisconsin-Milwaukee --

MR. GROSSMAN: I'd ask you to skip the side things that don't really have to deal with your qualifications because once you've --
THE WITNESS: Okay. Hold on. We --
MR. GROSSMAN: -- once you've finished with your qualifications, I'm going to open up to what they call a voir dire, which is to have you examined about that. So I want you to stick to things that directly pertain to your qualifications.
THE WITNESS: Okay. Ph.D., meteorology; assistant professor, then associate professor at the University of Wisconsin-Parkside in the field of earth sciences, teaching meteorology, climatology, and other courses, environmental science.
MR. GROSSMAN: Okay.
BY MS. ROSENFELD:
Q And, Dr. Cole, what years were you teaching?
A Excuse me?
Q What years were you teaching?
A That would be from 1969 to 1977. In 1977 I was offered an intergovernmental loan position with the United States EPA. I had that for two years in the modeling section, the Source Receptor Branch, which is the very branch that writes guidelines for modeling. After two years --

Q And could you please explain a little bit more about what you did during that two years working on the receptor issues?
MR. GROSSMAN: This was an EPA loan, did you say, or a grant or --
THE WITNESS: There's a program called Intergovernmental Loan --
MR. GROSSMAN: Okay.
THE WITNESS: -- in which someone from a state university or another governmental department can go to another agency, the agency picks up the funding, and then the person can go back to their institution. Well, after two years I was offered a position as senior scientist and later as a section chief at the EPA's Office of Air Quality Planning and Standards.
BY MS. ROSENFELD:
Q So let me just clarify the loan. They loaned you; it wasn't a financial loan to you?
A No, no, no, no. It was, I was -- I was the loan.
Q You were the loan. It was a physical, they got --
MR. GROSSMAN: Okay. Now, I did have that confusion. I --
MS. ROSENFELD: Right.
THE WITNESS: I'm sorry. I was the loan.
BY MS. ROSENFELD:

Q The one agency loans you --
A I was loaned --
Q -- the person, for your expertise, right?
A -- from the university to U.S. EPA, the Office of Air Quality Planning and Standards. You asked my role?
Q What did you do during that --
A I was a senior --
Q -- those two years?
A I was a senior scientist, and I provided advice to the branch and to the division that dealt with modeling, air quality modeling.
MR. GOECKE: And this is from 1979 to 1981 or --
THE WITNESS: My full period at EPA was from 1977 to 1983.
MR. GOECKE: Okay.
THE WITNESS: Okay? So my job there was to provide scientific input advice, and I later became the section chief of the model application section where I had responsibility for a number of projects and people under my direction who were involved in model applications.
In 1983, after being there for five or more than five years, I -- well, let me put it to you this way: Mr. Reagan became president. He appointed Madam Gorsuch, Anne Gorsuch, whose mission was basically to freeze out the agency from any regulatory --

MR. GROSSMAN: Well, let's keep the politics out of this --
THE WITNESS: I am telling you why I --
MR. GROSSMAN: -- and just go directly with your qualifications.
THE WITNESS: Okay. I left. I became the science director of Clean Water Fund and Clean Water Action -- those are 501(c)(3), (c)(4s) and -- (c)(3) is the fund; (c)(4), the organization -- where I engaged in multiple studies involving hazardous waste sites, involving hazardous waste incinerators.
MR. GROSSMAN: And this is called the Clean Water Fund?
THE WITNESS: Yes.
MR. GROSSMAN: Okay.
THE WITNESS: I did a series of reports on mercury contamination, some of the earliest reports signaling the problems with incineration and coal burning as a, releases into the atmosphere the mercury fumes, and then their deposition into bodies of water and the food-chain accumulation in the aquatic food chain.
MR. GROSSMAN: And you were in this post from 1983 until when?
THE WITNESS: 1983 until 1993. Then I started Henry S. Cole & Associates, environmental --

MR. GROSSMAN: You didn't go back to University after your loan to the --
THE WITNESS: No. No.
MR. GROSSMAN: Okay. You weren't re-institutionalized, in other words?
THE WITNESS: No.
MR. GROSSMAN: Okay. All right. Go ahead. And after 1993?
THE WITNESS: 1993 to the present I founded Henry S. Cole & Associates, an environmental science consulting firm, and my clients have ranged from community organizations to very large corporations and the federal government, county governments.
MR. GROSSMAN: All right.
THE WITNESS: So the rest, I imagine, will come out on voir dire.
MR. GROSSMAN: Okay.
THE WITNESS: Is that how you say it?
MR. GROSSMAN: Voir dire.
THE WITNESS: Voir dire.
MR. GROSSMAN: Voir dire, yes. Any other questions regarding the witness's qualifications?
BY MS. ROSENFELD:
Q Dr. Cole, have you written any publications that would be germane or inform your views on this case?

A Yes. I wrote numerous publications on several subjects. One was on the air pollution of coastal meteorology as it affects air pollution. If you look at any, at any article on shoreline fumigation or lake-breeze circulations, the shoreline model, which I was a major contributor to both before I went to EPA and at EPA, you'll find Lyons and Cole or Cole and Lyons referenced in, in any of those journal articles. Really, the work that I did at EPA, which was to, was the basis for the so-called shoreline model, Shoreline Dispersion Model, I did the prototype, it was later further developed by others, but it was my interest and my knowledge about coastal meteorology which fueled that particular model and project.

Q Now, Dr. -- oh.

A The second area was on photochemical smog, and I did a lot of work on the Urban Airshed Model, which is an urban scale photochemical grid model. I wrote -- we in our section did a lot of applications, St. Louis was one city, Los Angeles another, where the model was used with all of its inputs, emissions, meteorology, and whatnot and chemistry, atmospheric chemistry, and our job was to see how accurate this model was in producing the fields of air pollution, particularly during warm summer conditions when -- which is when you get photochemistry going on in the atmosphere. Okay.

Q And, Dr. Cole, in your role at EPA, were you a regulator? Did you review and approve or deny permit applications?

A No. No.

Q Did you review applications or advise anybody on modeling?

A Yes. I provided advice actually to the assistant administrator of EPA, David Hawkins, on at least one case, which was a very critical case involving international transboundary pollution from the United States to Canada. It was the Eastport refinery in Maine where coastal meteorology was a big factor. So I had to go to Washington and talk to Mr. Hawkins a number of times and provide advice. I provided scientific input into modeling questions, into modeling guideline questions. The branch chief was Joseph Tickvart, who really was at the corner of putting together the modeling guidance for many, many years. He was my supervisor. So I got to advise him.

Q And so was your role more in the function of reviewing, reviewing modeled information and analyzing it?

A Yes. Were the right models used for the site conditions properly incorporated into the modeling, those kinds of questions; how do you, how do you account for certain atmospheric transformations, for example, NO2 formation. I did a paper, a research paper on methods,

various methods to figure out how much of the oxides of nitrogen from automobiles or power plants were being converted to NO2. So those were the kinds of -- my job was to give scientific input to the regulators and that's pretty much what I did.

Q Okay, thank you.

MS. ROSENFELD: Mr. Grossman, I'd like to move Dr. Cole as an expert in the field of meteorology and in the field of air quality and in the science of air modeling.

MR. GROSSMAN: Okay. So meteorology, air quality, and air modeling, is that it?

MS. ROSENFELD: And the scientific protocols of air modeling.

MR. GROSSMAN: Air modeling and its scientific protocols?

MS. ROSENFELD: Right.

MR. GOECKE: Is that a subset or two different categories in --

THE WITNESS: Mr. Hearing Examiner --

MR. GROSSMAN: Yes.

THE WITNESS: -- if I could suggest, also, the general category of scientist --

MS. ROSENFELD: Okay.

THE WITNESS: -- which I believe is critical.

MR. GROSSMAN: All right. I don't know. I mean,

that's so general as to, but --

THE WITNESS: Can I --

MR. GROSSMAN: Yes, sir.

THE WITNESS: -- answer that?

MR. GROSSMAN: Certainly.

THE WITNESS: Science has certain practices. It's a discipline maybe founded on curiosity, but the second thing that comes in is doubt. Issues like uncertainty are so critical when it comes to the atmosphere. So an understanding of the basic premise of scientific research, hypotheses, theories, how you get from one to the other, the critical process of examination of evidence, does the, does, are the findings properly supported by the conclusions -- all of those are present in every science but, I would state, are particularly important in this particular case and whenever you're dealing with complex issues like the dispersion of pollutants in the atmosphere.

MR. GROSSMAN: All right. So do you think this description adequately identifies your expertise: meteorology, air quality, air modeling, and scientific protocols and scientific methodologies?

THE WITNESS: And I would add one more for the record.

MR. GROSSMAN: I always want to add one more to my qualifications too.

THE WITNESS: Well, you're going to like this one.
MR. GROSSMAN: Yes.
THE WITNESS: I received my driver's license in 1961. That means I've been driving for almost 50 years or more than 50 years.
MR. GROSSMAN: Yes.
THE WITNESS: So I have a lot of on-the-road experience with traffic. I suggest everyone else in this room, including you, do as well, but I think that happens to be germane to this particular case.
MR. GROSSMAN: That's more of a layman's thing. Yours is more driving home a point than driving a car. So we'll leave that off --
THE WITNESS: You can --
MR. GROSSMAN: -- off of the qualifications.
THE WITNESS: Okay. I'm just saying that because I think sometimes everyday experience informs the scientific process.
MR. GROSSMAN: I understand, but we'll consider that more in the layman's area. Did you get any training in Windows 8 while you were -- I see it up on the board there.
THE WITNESS: No --
MR. GROSSMAN: Oh, so that's --
THE WITNESS: -- I'm not an expert in that. I have to -- my son is the expert.

MR. GROSSMAN: Yes, that's the way it is. All right. And before we begin voir dire, it just popped into my mind also, in terms of the dates available, if the parties wanted to have further dates in December, we could make some of those available as well. I generally try to avoid --
THE WITNESS: Christmas.
MR. GROSSMAN: Yes, well, certainly on Christmas Day, but I generally try to avoid them in the last couple of weeks because people take vacations and whatnot and then it makes it harder for the public to attend. So I didn't schedule any in late December, but if the parties think that that would be better, you know, please let me know.
I have a hearing on December 13 myself, and we have some others, but we could probably get a room. But I think that, other than my hearing on December 13, I think my calendar would be relatively clear up, at least up until the, you know, through the second week in, well, I guess we get kind of close, maybe through the third week. So, anyway, you ought to consider that and see if there are any dates that you all want to agree to and then just contact me, and I'll make sure they're clear on my calendar.
MS. ROSENFELD: Well, Mr. Grossman, I can go ahead and put that to rest.
MR. GROSSMAN: Okay.

MS. ROSENFELD: In accommodating the five days that we had just before and after the Thanksgiving holiday, I had taken other matters that I had planned to work on and pushed them. I have briefing schedules and hearing dates in other matters, and there is not a chance I will be able to accommodate a hearing date between now and Christmas.
MR. GROSSMAN: Okay. All right, fair enough. Okay. Voir dire --
MR. GOECKE: Thank you.
MR. GROSSMAN: -- of Dr. Cole.
MR. GOECKE: Yes. Dr. Cole, while you worked at EPA, you testified that you reviewed air modeling reports or --
THE WITNESS: Oh, yeah. Yeah.
MR. GOECKE: Did you ever conduct them yourself? Did you ever perform your own air modeling?
THE WITNESS: Yes.
MR. GOECKE: And tell us about that.
THE WITNESS: Well, I developed something called the Ozone Limiting Method, which is a very simple model.
MR. GOECKE: So you developed a method --
THE WITNESS: A method. I --
MR. GOECKE: -- and did you actually apply that anywhere?
THE WITNESS: Yeah. It's very easy to use.

MR. GOECKE: Where did you apply it?
THE WITNESS: Where did I apply it?
MR. GOECKE: What did you model with this method?
THE WITNESS: Various cases that -- to try it out, see how good it worked. I can't recall the exact issues. Now, when you say did I conduct the model, I have to be careful here because in those days the modeling was actually done by a computer division. It was called the, I believe, the model support section. So what we did in my section was to put all of the inputs together, be it a power plant or in one case it was a hazardous waste pond, a lot of power plant stuff, where, as branch chief, I mean, as section chief, I would be very involved in creating the inputs and then working with the people on my staff and then the modeling was done.
MR. GOECKE: By a computer or --
THE WITNESS: Yeah, by the computer. In those days, it was a big, I mean, we're -- this was a while ago; so you didn't have something like this where you could, you could do it. But I had to be on top of all of the modeling that was done in my section.
MR. GOECKE: Right, but -- so it sounds like you were part of a team that gathered numbers.
THE WITNESS: I was the head of the team.
MR. GOECKE: You were the head of the team?

THE WITNESS: The head of the team.
MR. GOECKE: Okay. And in your role as head of the team, exactly what were your responsibilities?
THE WITNESS: To make sure all of the output of that team passed muster, because it was passed up to the next level and it had to be right.
MR. GOECKE: Okay. Well, that's sort of general when you say the team had to pass muster. So what was your team doing? They were -- was this theoretical modeling? Were these actual sites they were modeling?
THE WITNESS: Actual sites.
MR. GOECKE: Okay. And during your time at EPA, how many, how many modeling projects do you estimate you were in charge of?
THE WITNESS: That's a hard question to ask.
MR. GROSSMAN: Well, it's a hard one to answer maybe but not to ask it.
THE WITNESS: Oh, okay, right. Well, I'm asking myself; so it's --
MR. GROSSMAN: I see.
THE WITNESS: I got to say it's, you know, 50, 70. I'm not sure.
MR. GOECKE: And were you responsible for developing the data, or did other people develop the data that was put into the computer and you quality-checked it?

MR. GROSSMAN: What do you mean by developing the data? Do you mean actually collecting the data or -- is that what you mean?
MR. GOECKE: Yes. That's a better way to put it, I think.
MR. GROSSMAN: Okay.
MR. GOECKE: Did you actually collect the data that was used for the air modeling?
THE WITNESS: My job was more to examine the data that was being used --
MR. GOECKE: Okay.
THE WITNESS: -- to make sure that it was representative, that it considered the prevailing circumstances, did they use a representative meteorological site, that sort of thing.
MR. GOECKE: Okay. So your answer is you did not collect the data; you evaluated the data?
THE WITNESS: Right.
MR. GOECKE: Is that correct?
THE WITNESS: Right.
MR. GOECKE: Okay.
THE WITNESS: That is not to say that in my career I have not collected data. In my work at the university, my research work, which was funded by EPA, I had the great opportunity to ride around in a helicopter, getting

nauseous, following plumes from the Oak Creek power plants, using an SO2 meter. I also conducted micrometeorological, on a mesoscale, meteorological testing, using tethered balloons and radiosondes and radiosondes. So before I got to EPA, I was very active in collecting data relevant to modeling.
MR. GOECKE: Okay. So is it fair to say that since you started working at EPA, you haven't collected data for any air modeling?
THE WITNESS: Since I worked at --
MR. GOECKE: So you gave examples of when you collected data from the time period before you worked at EPA.
MR. GROSSMAN: You mean personally as opposed to his team?
MR. GOECKE: Personally, yes.
MR. GROSSMAN: Okay.
THE WITNESS: After EPA or at EPA? What are you -- I'm sorry. Rephrase your question.
MR. GOECKE: Your examples of when you actually collected data were from the time period before you worked at EPA, correct?
THE WITNESS: Correct.
MR. GOECKE: And at EPA you evaluated data, but you didn't actually collect it?

THE WITNESS: Well, let's take a step back. There's data, which is things like five years of meteorological data, right? Other people collect that. That's called the National Weather Service. They do that. You take a file from them. So, in a sense, it's normal to use data that others have collected. Point No. 2 is that there's another kind of information that I did do in spades which is literature, looking at the studies that other people have done, which give profound insights into the modeling process, into air pollution meteorology, into special circumstances.
MR. GROSSMAN: I think this question goes more to physical collection --
MR. GOECKE: Correct.
MR. GROSSMAN: -- of data yourself.
THE WITNESS: All right. So physical collection, most of that was done at the University of Wisconsin, EPA-funded research.
MR. GOECKE: Okay. Okay. Now, let's move along to after you left EPA and went to the Clean Water Action and Clean Water Fund. Did you do air modeling while you worked at the Clean Water Action?
THE WITNESS: I may have used screened, screening models. I didn't do -- at Clean Water Fund, I was far more, did far more research into sources of air pollution,

particularly in connection with mercury contamination. We did --

MR. GOECKE: Okay. Just going back to the modeling, though --

THE WITNESS: Yeah, right.

MR. GOECKE: -- so you said you might have done screening modeling. What does that mean?

THE WITNESS: Yeah. It's like -- well, now it's SCREEN3, but the early screen programs that you could get just a general idea of, an approximation of what a model would show given certain sources, emission levels, characteristics, plume height, that sort of thing.

MR. GOECKE: So is it fair to say that it was, it was less precise --

THE WITNESS: Absolutely.

MR. GOECKE: -- than the modeling you were doing at EPA?

THE WITNESS: Yeah, absolutely.

MR. GOECKE: Okay.

THE WITNESS: Yep.

MR. GOECKE: And it was probably less involved of a process as well?

THE WITNESS: Excuse me?

MR. GOECKE: The screening is a less-intensive, less-involved process than --

THE WITNESS: Oh, yeah, definitely.

MR. GOECKE: Okay.

THE WITNESS: Yeah.

MR. GOECKE: And you said you may have done that. You're not sure whether or not you did?

THE WITNESS: I'm sure I played around with it, but I wouldn't call that modeling as much as staying in touch with the field.

MR. GOECKE: Okay. So in the 10 years that you were at Clean Water, you didn't do any of the type of air modeling that you were involved in at EPA?

THE WITNESS: No.

MR. GOECKE: Okay. And then in 1993 you formed Henry S. Cole & Associates.

THE WITNESS: Right.

MR. GOECKE: Since forming your company, have you done any air modeling of the type that you were doing at EPA, that your team was doing at EPA?

THE WITNESS: Yes, we did, yes.

MR. GOECKE: Okay. And tell me about that.

THE WITNESS: Okay. The most important case was for the Attorney General, Science Division, of the State of New York. My team did, modeled Kodak's industrial, Kodak Eastman's industrial facility. There were issues about whether their facility was violating air quality standards,

and we were asked to do the modeling. We used the ISC model.

MR. GROSSMAN: What is --

THE WITNESS: Industrial Source Code model, which is sort of the precursor, I won't say it's -- I'll say it's the precursor of AERMOD.

MR. GOECKE: Okay.

THE WITNESS: I had --

MR. GOECKE: And what year was this?

THE WITNESS: -- just to be very clear, I had a computer person who I familiarized with the model; then it was my job to make sure -- and, by the way, this was a complex issue because we had complex terrain -- and I had to make sure that the way we were doing this fit the circumstances. There was a power plant down in the river valley there next to Eastman and that power plant was one of the issues affecting air quality in the region.

MR. GOECKE: And what year was this?

THE WITNESS: Oh, I'd have to look at -- I can come back to that if I look at my publications --

MR. GOECKE: Okay. Are there any --

THE WITNESS: -- but it was, it was maybe -- I'm going to take a stab and say it was maybe 2007, 2006.

MR. GOECKE: Okay. Are there other cases that you worked on that required you to participate in air modeling

of a site?

THE WITNESS: Yes.

MR. GOECKE: And what are they?

THE WITNESS: Not to conduct the modeling, but to review the modeling done by others.

MR. GOECKE: Not to review, to actually conduct it.

THE WITNESS: No.

MR. GOECKE: Okay.

THE WITNESS: Just, as I said, I've used SCREEN3 many times to get a feel for what was going on, but my firm does not have the resources to do all of the complicated work that's, all of the input work, and that's not my specialization. My specialization is air pollution, the critical review of techniques.

MR. GOECKE: I'm sorry. Your specialization is not what?

THE WITNESS: I'm saying, I'm saying, as a scientist --

MR. GOECKE: Yes.

THE WITNESS: -- I have had a number of cases -- and I can give you specifics -- of where I've had to review the modeling -- most of it was AERMOD -- that others have done, taking a critical look at what they've done.

MR. GROSSMAN: But you cut yourself off when

you --
THE WITNESS: I'm sorry.
MR. GROSSMAN: -- you started to say my specialty is not, and then you didn't finish the sentence.
THE WITNESS: Well, my activity -- let me rephrase that -- my activity in other modeling cases, and including very recent cases, has to do with the critical review of other modelers' work. Okay? Now, I have also worked in partnership in my firm with another modeling group, David Weeks' group, which is out of Texas, it's RME, where the question has been the effects of landfills, emissions and odors from landfills, and he has done the modeling in those cases.
MR. GROSSMAN: So are you saying that your main, if you want to say specialty, your main occupation has not been doing the modeling yourself but rather to critical review of --
THE WITNESS: Yes, right.
MR. GROSSMAN: Okay.
MR. GOECKE: So it's fair to say that since leaving EPA, you've only conducted air modeling once?
THE WITNESS: Okay.
MR. GROSSMAN: Well, is that fair to say? I mean, that's --
THE WITNESS: I said yes.

MR. GROSSMAN: Okay. Well, you said okay. I just want to --
MR. GOECKE: Has air modeling changed much in the past 30 years?
THE WITNESS: Absolutely.
MR. GOECKE: So the air modeling that's done today on sites is very different than the types of modeling that was done when you worked at EPA in the late '70s and early '80s?
THE WITNESS: Yes, and by the way, we were laying the groundwork. We understood and I understood some of the problems with the existing models. Now, AERMOD, which is what Mr. Sullivan has used in this case, is in fact a tremendous advancement over previous models, and if you want examples, I can give you examples of the kinds of changes.
MR. GOECKE: If your company doesn't have the wherewithal to do air modeling, how was it that you did the air modeling on the Kodak site you talked about in 2006 or 2007?
THE WITNESS: I told you I partnered with a firm that had the computing capacity -- no, wait a minute. Which period are you talking about?
MR. GOECKE: The Kodak project you talked about. You said it was 2006 or 2007.
THE WITNESS: Yeah. Normally --

MR. GOECKE: So you partnered with another firm?
THE WITNESS: -- we don't do that, but I partnered with Hampshire Research that had a computer, a person who was familiar with models and computation.
MR. GOECKE: So Hampshire Research did the modeling there?
THE WITNESS: Yes.
MR. GOECKE: So you did not conduct the modeling?
THE WITNESS: I supervised. In other words, it was sort of like what I did at EPA --
MR. GOECKE: Okay.
THE WITNESS: -- making sure that the modeling was being done -- you know, modeling is a very involved process, as Mr. Sullivan, I'm sure, will tell you.
MR. GOECKE: You testified that you worked for some major --
MR. GROSSMAN: Well, you cut the witness off.
MR. GOECKE: I'm sorry.
MR. GROSSMAN: As Mr. Sullivan, say --
THE WITNESS: There are so many inputs and choices and databases to massage and whatnot to convert to the proper form. It's very complex work, but -- I'm sorry. What was your question?
MR. GOECKE: I think you answered my question.
MR. GROSSMAN: Well, I think you were finishing

answering. I just --
THE WITNESS: Oh.
MR. GROSSMAN: -- I stopped him because I think he cut you off in the middle of your sentence --
THE WITNESS: Okay. So --
MR. GROSSMAN: -- when you said Mr. Sullivan, and then you were cut off.
THE WITNESS: Yeah. So my -- that would not be the best use of my scientific expertise --
MR. GROSSMAN: What do you mean?
THE WITNESS: -- so I partner with others. I told you. It's the insurance that the science, the circumstances, the topography, the land use, the conditions of the source are incorporated into the modeling.
MR. GROSSMAN: Okay.
MR. GOECKE: And I'm sorry. Did you say it would not be the best use of money to hire you to do the air modeling? Is that what you --
THE WITNESS: I didn't say anything about money. I said my, my, the role that I play -- the best role that I can play is to use my scientific expertise to guide or to review modeling.
MR. GOECKE: Okay. Earlier you mentioned that you worked for, I think you said, major, major corporations.
THE WITNESS: Yeah.

MR. GOECKE: Who did you work for?
THE WITNESS: Okay. I'll start with, start with Church & Dwight.
MR. GOECKE: Church & White?
THE WITNESS: Dwight.
MR. GOECKE: What did you do for Church & Dwight?
THE WITNESS: That's the company that makes Arm & Hammer Baking Soda products.
MR. GOECKE: Okay.
THE WITNESS: There, I would say, that was part of the work that I've done in environmental assessments that go beyond the scope of air pollution. What I had to do for them was to do an assessment of the environmental benefits of using concentrated detergent as opposed to the normal detergent that was on the market at that time. They came out with one of the first concentrated detergents, and there were many, many benefits, including air pollution benefits because the weight -- there was a reduction in weight of the transfer of these products because the material was concentrated, had less water.
MR. GOECKE: Okay. Have you ever worked for --
MS. ROSENFELD: Let him finish.
MR. GOECKE: I'm sorry. I'm sorry.
THE WITNESS: Let me finish --
MR. GOECKE: Sure, sure, sure.

THE WITNESS: -- because you asked for a listing and that was the first. Okay. Glass Packaging Institute, okay? There we were comparing, or doing an environmental assessment, comparing glass bottles versus plastic bottles, and that involved air pollution issues as well, not modeling, but emissions.
Third, Allstate Insurance Company. There I was doing a, what I would call a forensic study. There was an issue of a perchloroethylene spill at a dry cleaners which was contaminating the water and which was giving off fumes; groundwater was contaminated and there were fumes that -- and the issue, the key issue there, it was a fascinating case because the key issue was the timing of that spill, and the claimants claimed that the spill was after the coverage took effect, and Allstate said no, no, no, your spill was way before we had a policy with you. I used three or four lines of evidence to prove that in fact the spill occurred way before.
MR. GROSSMAN: Okay.
THE WITNESS: I used, looking at the ratios of the chemicals and its decayed products in the groundwater, I used a number of tools. I had to look at records of when perchloroethylene was delivered to the site. I inspected the place and found telltale evidences of previous practices at -- which would never be used in the coverage period.

So --
MR. GROSSMAN: Okay.
THE WITNESS: -- it was a fun, a fun project.
Let's see. Let's go to Philips Electronics. Now, there, in case you think that I only work with environmental groups, I had to come up against environmental groups, working for Philips Electronics, and there the issue was the -- in the State of California, the, several of the competing fluorescent light manufacturers wanted a recycling bill. They wanted the credit for source reduction -- in other words, the lowest possible mercury content of the light -- removed from the regulations and replaced by a recycling provision. Well, I did an analysis that showed that source reduction, toxic use reduction, having the lowest amount of mercury to get into the atmosphere, was far better than any attempts to try and recycle all of the fluorescent lights, a near impossibility. So that was -- where am I? That was Philips Electronic.
Chemical Specialties, Incorporated, known as CSI, but I didn't say CSI because --
MR. GROSSMAN: It has other --
THE WITNESS: Right, has other -- right. CSI is now owned by Dow Chemical. I was not a consultant for Dow Chemical. I was, this was --
MR. SILVERMAN: Glad you clarified that.

THE WITNESS: -- anyway, this was -- I think I worked for them for seven years, and the issue there was, the market standard for pressure-treated wood was a product that contained both arsenic and chromium, it's called CCA, and there were mounting concerns about bringing this stuff into homes, playgrounds, where children and whatnot would come into contact with, with arsenic and chromium, both of which are carcinogens. They came up with a product which had neither chromium nor arsenic, and they used a common household disinfectant or one that's used all over the place instead, upped the copper content a little bit, and my job was to do sort of an analysis of their product versus the other product in terms of environmental impact. And they were very, very concerned about, would this add copper to the environment, would it add copper to the aquatic environment, which copper is toxic to fish, and so I had to do a lot of work with the releases of copper from wood in terms of literature reviews, in terms of looking at experimental evidence. So I would say, I emphasize the fact that an environmental assessment is an important part of what I do. I look at the evidence and try to come to conclusions.
Now, I'm very proud of my work there. For my work I was co-recipient of a very prestigious award called the U.S. EPA's Presidential Green Chemistry Challenge Award,

along with CSI, was a very proud moment to get that certificate that said that. And the reason for that was that the work that we did collectively, including my work, which included communication to health groups and communication to environmental organizations and whatnot, resulted in a phaseout of those preservatives which contained both copper and arsenic --

MR. GROSSMAN: All right. Any other corporations --

THE WITNESS: -- and chromium. I'm sorry, chromium and arsenic.

MR. GROSSMAN: Any other corporations that you wanted to mention?

THE WITNESS: I think those are the, I may be forgetting one or two, but I think -- there was, yes, there was a real estate company called Gravestar in the Boston area which I worked for for a number of years. They owned and operated the real estate that had shopping centers. If anyone's here from the Boston area or if you've ever heard of a Star Market, that was -- wherever you go to a Star Market that's those places. So there were a number of environmental issues, such as spills, such as redesigning one of them in particular to make them more sustainable, and my role there was scientific advisor, making sure they were making good decisions.

MR. GROSSMAN: Okay. Any further voir dire questions?

MR. GOECKE: Just a few. In terms of your purported expertise in air quality, you're not planning to give any medical testimony, are you?

THE WITNESS: No, absolutely not.

MR. GOECKE: And you're not a medical doctor?

THE WITNESS: Correct.

MR. GOECKE: You're not a toxicologist?

THE WITNESS: Correct.

MR. GOECKE: You're not an epidemiologist?

THE WITNESS: I would say, however, that one of my important projects has been work that's been funded, retained by the CDC, Centers for Disease Control and Prevention, specifically the Agency for Toxic Substances and Disease Registry. I was a critic of that agency when I was at the Clean Water Fund, and I had reviewed a number of their so-called health assessments and health studies at Superfund sites. So a lot of my work had to do with Superfund and hazardous waste sites, and as a scientist, I was appalled at those assessments and health studies that were being done.

I had a debate at some event with the director then, who was Barry, Dr. Barry Johnson, a very respected person in the field, and two weeks after I left Clean Water

Fund, I got a phone call from Mr. Johnson, Barry Johnson, and he said we need to bring you in and make sure that the quality of those assessments are a lot better, and this involved things like air pollution impacts, groundwater impacts, all sort of things. So I had to become familiar with the area of risk assessment, for example. I had to be able to read those, understand the techniques, and I don't claim to be an expert in risk assessment or in health assessments, but I sure know one when I see it and I can tell you what is not included. For example, a lot of them didn't --

MR. GROSSMAN: Well, let's not get into the substance --

THE WITNESS: Okay.

MR. GROSSMAN: -- of your testimony.

THE WITNESS: All right.

MR. GROSSMAN: We're first dealing with your qualifications.

THE WITNESS: So I had, I worked for them for a number of years, major projects. The last project that I had with them was as a liaison in a very complex case involving a cancer cluster in coal country in northeast Pennsylvania where there was an outbreak of a very rare blood cancer and they -- Senator Specter, through his work, got $8 million to fund a number of studies. There were 10

different studies underway. My job was to help the community understand what those studies were and to get community input into those studies. For example, someone might say, well, you didn't, you didn't look at this area or there are five other cases of polycythemia vera that are not in your database, five people died just last year, those kinds of things, make sure you look at this Superfund site. There were six Superfund sites and six coal-burning power plants in that area.

So this was a very complex -- air pollution was an issue; another issue was the, which I was heavily involved in, was the windblown dust from coal ash. Coal ash is very toxic, small particles that can be breathed in, and this stuff was -- there was evidence that it was being released into the atmosphere. So that was an important facet of this work that I felt was being neglected in terms of the environmental assessment that was going on, and I made recommendations, sadly to say, not all of which were followed, but nevertheless --

MR. GROSSMAN: All right.

MR. GOECKE: Just one final question --

THE WITNESS: Yeah.

MR. GOECKE: -- Mr. Grossman. Dr. Cole, you testified about a few publications you authored relating to air modeling. As I look through your résumé, it seems like

those publications were all in 1976 or before, I'm sorry, 1979 or before.
THE WITNESS: Yeah, I think that's -- well, I did reports on mercury contamination, but if you're talking about modeling --
MR. GOECKE: Modeling, yes.
THE WITNESS: -- with the exception of the report that was given to the attorney general's office, which was not a publication.
MR. GOECKE: The Kodak matter?
THE WITNESS: Yeah.
MR. GOECKE: Okay. And that was not peer-reviewed?
THE WITNESS: Well, it was, it was reviewed by the science department of the attorney general, a pretty sharp outfit, I must say --
MR. GOECKE: Okay.
THE WITNESS: -- under the direction of, was it Spitzer at the time? I don't know.
MR. GROSSMAN: What's the exhibit number for Dr. Cole's résumé?
MR. GOECKE: 76(h). It's a part of 76(h).
MR. GROSSMAN: Okay. 76(h)?
MR. GOECKE: Yes.
MR. GROSSMAN: Okay. All right. Does the

Coalition have any voir dire questions?
MR. SILVERMAN: No, we don't.
MR. GROSSMAN: Okay.
MS. ADELMAN: No, we do not, sir.
MR. GROSSMAN: All right.
MS. ROSENFELD: Mr. Grossman, if I may, I just have several follow-up questions.
MR. GROSSMAN: Sure.
BY MS. ROSENFELD:
Q Dr. Cole, you explained how, during your time at the EPA, the modeling itself was done by the computer division, that you would put together, you called them inputs, and then they were actually run by the computer. Is that correct?
A Yes, that's correct.
Q And although the form of computer has changed, is that essentially the way modeling is done today? Does somebody calculate those numbers by hand or can you, is it different --
A It's so much easier today. Mr. Goecke asked how modeling has changed. I mean, in some cases, we were using punch cards. Today you can take stuff from the National Weather Service, five years of data, you put it into something that makes it compatible to AERMOD, and it can all be done with great simplicity. It's easier than it was. So

in those days --
Q I guess my --
A Yes, what's -- your question is?
Q My question is, although the look of the computer --
A Yeah.
Q -- and the size of the computer, no doubt, has changed --
A Yeah.
Q -- are those modeling runs today done by computer?
A Yes. Yes.
Q As they were when you were at the EPA?
A Yes. The models are more advanced, but you have computers --
Q Computer software.
A -- sorting through bits and making calculations and --
Q Okay. Mr. Goecke asked you a great number of questions about whether and when and where you actually collected physical samples of data.
A Most modelers --
MR. GROSSMAN: Well, she hasn't asked the question yet.
THE WITNESS: Okay, sorry.
BY MS. ROSENFELD:

Q Oh, yes. My question is, did Mr. Sullivan collect any physical samples of data in this case for air modeling?
MR. GROSSMAN: Well, that's not a voir dire question.
MS. ROSENFELD: Okay. Okay.
MR. GROSSMAN: We're talking right now about his qualifications.
MS. ROSENFELD: All right.
BY MS. ROSENFELD:
Q In your description of what you do currently, in your current practice --
A Right.
Q -- you, I think -- is it accurate to say that you take a look at scientific models that other people have run and you review them to determine if, in your opinion, they meet certain standards of accuracy? Is that correct?
A That's correct.
Q And is that essentially the same role that you served in when you were chief of the air division at EPA?
A More or less. I had other, you know, yeah.
Q And finally, would you please -- have you qualified as an expert in other proceedings?
A Yes.
Q And could you give three or four examples of when you qualified as an expert?

A Let's see. Well, I'm going to trial on one case in February.
MR. GROSSMAN: Have you testified as an expert?
THE WITNESS: Yes.
MR. GROSSMAN: When have you testified, not when you --
THE WITNESS: Okay.
MR. GROSSMAN: -- you said you were going to.
THE WITNESS: All right. My -- the best example I can give you is I wrote a report on the modeling that was done on a municipal waste incinerator in the Netherlands. I was commissioned to do that by the local community of the town because they felt that the license that the Province of Friesland had given, an air quality, an air pollution permit to this facility, was flawed. So they had me look at the modeling and review the modeling, write a report. I submitted that report to the highest court in the land for disputes between residents or citizens and the executive branch governance -- it's sometimes called the Supreme Court of Administrative Matters -- and so I was qualified in that as an expert.
MR. GROSSMAN: They took your report. Did you testify on the stand under oath?
THE WITNESS: Yes, I testified in open court between --

MR. GROSSMAN: Okay.
THE WITNESS: -- was, you know --
MR. GROSSMAN: That's the question.
THE WITNESS: -- testified, cross-examined, et cetera.
MR. GROSSMAN: And what was your area of expertise that you --
THE WITNESS: Air pollution, meteorology, and modeling.
MR. GROSSMAN: All right. Any other testimony, Doctor?
THE WITNESS: I would also say that my work there was reviewed by two preeminent experts in the field, Dr. Misra in Ontario, who did a lot of shoreline modeling, and also Dr. Van Dop in Netherlands, who testified -- Dr. Van Dop testified --
MR. GROSSMAN: Did you --
THE WITNESS: -- supporting my evidence there.
MR. GROSSMAN: -- testify as an expert in any other proceedings?
THE WITNESS: I'm having to focus, or having to think this through because I have testified in, let's say, quasi-judicial hearings, which are a little bit different --
MR. GROSSMAN: Well, this is a --
MS. ROSENFELD: Well, this is.

MR. GROSSMAN: -- quasi-judicial hearing as well.
THE WITNESS: Yes, it is.
MR. GROSSMAN: The question is, did the, whoever was running the proceeding qualify you as an expert and in what.
THE WITNESS: Well, I testified before the Public Service Commission in the State of Wisconsin.
MR. GROSSMAN: Okay.
THE WITNESS: And I, see, I don't know -- what I was able to do was to give a presentation and to cross-examine -- I was cross-examined, and I cross-examined the expert witness. It was a process where everyone could cross --
MR. GROSSMAN: A free-for-all.
THE WITNESS: Free-for-all.
MR. GROSSMAN: But did the commission designate you as qualified as an expert?
THE WITNESS: See, I don't remember. That was a while ago.
MR. GROSSMAN: Okay. All right. Anything else? Any other testimony as an expert?
THE WITNESS: I know I'm forgetting some things because I'm in the process now of a number of cases, one of which will come to trial in February.
MR. GROSSMAN: Right now the question is not

whether you collected information, given advice. The --
THE WITNESS: Well, how about --
MR. GROSSMAN: -- question is whether you've testified as an expert, and you listed two cases, one in the Netherlands --
THE WITNESS: Yeah.
MR. GROSSMAN: -- and one before the Public Service Commission in Wisconsin.
THE WITNESS: Yeah. I'm --
MR. GROSSMAN: Okay.
THE WITNESS: -- can I come back with --
MR. GROSSMAN: Well, we're going to handle the question of your qualifications now.
THE WITNESS: Okay.
MR. GROSSMAN: I don't have any problem with your --
THE WITNESS: Okay.
MR. GROSSMAN: -- supplementing additional ones --
THE WITNESS: Okay.
MR. GROSSMAN: -- unless they're objected to by the other side, so --
THE WITNESS: If --
MR. GROSSMAN: -- because they haven't had the opportunity to cross-examine you on it, but any -- is that it?

MS. ROSENFELD: That's it. Thank you.
MR. GROSSMAN: Any recross on this additional questioning?
MR. GOECKE: Do you know what year the Wisconsin hearing was?
THE WITNESS: Yeah. That would be 1977.
MR. GROSSMAN: And when was the Netherlands proceeding?
THE WITNESS: That was 2011.
MR. GROSSMAN: Okay.
THE WITNESS: I -- yes, wait a minute. I testified. I have another one.
MR. GROSSMAN: Okay.
THE WITNESS: The issue here, there's a nuclear power plant going in on the shoreline of Lake Ontario. The power company there wanted to expand, and there were some issues about the use of AERMOD, and there were regulations in place that said you had to consider site-specific information in the modeling. They did not incorporate the effect of Lake Ontario in that --
MR. GROSSMAN: Well, I don't really want to know that much about the, about the case. I want --
THE WITNESS: Okay. So, yes, I testified in that case.
MR. GROSSMAN: -- to know whether you testified in

that case.
THE WITNESS: Yes, I did.
MR. GROSSMAN: So what agency or --
THE WITNESS: It was called --
MR. GROSSMAN: -- body were you before?
THE WITNESS: It was a joint commission. It was a combination of energy and environment.
MR. GROSSMAN: Joint commission of what?
THE WITNESS: I'm going to have to get back to you on that. It was --
MR. SILVERMAN: The Great Lakes.
MR. GROSSMAN: Okay. Well, what year was that?
THE WITNESS: That was, I want to say, 2010.
MR. GROSSMAN: Okay. And you were qualified as an expert on that?
THE WITNESS: Yeah. I testified.
MR. GROSSMAN: Okay. All right. Any further questions, Mr. Goecke?
MR. GOECKE: I'm sorry. You testified in a court? I missed that part.
THE WITNESS: No. It was a quasi-judicial hearing.
MR. GOECKE: In the United States or in Canada?
THE WITNESS: I was in the United States. I was on, phoned in to the hearing which was taking place. I was

cross-examined. I was direct- and cross-examined over the phone into a, wherever it was, in Canada.
MR. GROSSMAN: Okay.
MR. GOECKE: I have no further questions.
MR. GROSSMAN: All right. Do you have any objection to this witness being qualified to testify as an expert in meteorology, air quality, and air modeling, and scientific protocols and scientific methodologies?
MR. GOECKE: I would stipulate to his expertise in meteorology and air quality but would object to him being designated as an expert in air modeling and in scientific protocols and scientific methodology.
MR. GROSSMAN: And what's your basis for your objection?
MR. GOECKE: That he hasn't conducted a single air modeling in the last 30 years; he hasn't written about it since 1979. He has consulted on several projects, but he has never been certified, from what I can tell, in an American court as an expert in air modeling or its protocols. So no other jurisdiction has deemed him as an expert in this area.
On the one hand, he says it's much simpler to do air modeling these days, but he also acknowledges there's been a lot of changes and there's been a lot of -- it's a lot more complicated and it's a lot more sophisticated

today, and we've heard no testimony about what his training has been in the AERMOD which, he testified, did not exist when he was at EPA. So the methodology that's being used here in this case is something entirely different than what he was doing at EPA, and while he may have been peripherally involved in these issues through the course of his consulting career, he is not an expert on this issue.
MR. GROSSMAN: All right. Ms. Rosenfeld, any response?
MS. ROSENFELD: And my response to that is that he not only has extensive educational background in air modeling and scientific protocols and its methodology but he has extensive professional background in that. Certainly, some of the work that he's done in his consulting career has involved not only the review of air modeling reports and protocols but he's testified as an expert on such and he's been involved in projects relating to that. He certainly is familiar with the current air quality standards, current air modeling protocols, as his reports that have been provided in this case demonstrate. And so I would ask that you qualify him as an expert in that area as well.
MR. GROSSMAN: Anything from the Coalition on this point?
MS. ADELMAN: No, sir.
MR. GROSSMAN: Okay. Yes, I find that objection

goes really to weight issues, not to his qualifications per se as an expert. So I do accept Dr. Cole as qualified as an expert in meteorology, air quality, and air modeling and the scientific protocols and scientific methodologies.

THE WITNESS: Thank you.

MR. GROSSMAN: You're welcome. All right.

BY MS. ROSENFELD:

Q Dr. Cole, have you reviewed Mr. Sullivan's November 2012 report in this case?

A Yes, I have.

Q And have you reviewed his August 2013 report in this case?

A Yep.

MS. ROSENFELD: And for the record --

THE WITNESS: Yes.

MS. ROSENFELD: -- Mr. Hearing Examiner, those are Exhibits No. 15(a) and 255(a).

MR. GROSSMAN: Okay.

BY MS. ROSENFELD:

Q Have you reviewed or are you generally familiar with Mr. Sullivan's other submissions in this case?

A Can you repeat that?

Q Have you reviewed Mr. Sullivan's other submissions --

A Yes.

Q -- in this case?

A Yes.

Q And are you generally familiar with his testimony in these proceedings?

A Yes.

Q And are you generally familiar with the Planning Board's staff report and the Planning Board recommendations in this case?

A Yes.

MR. GROSSMAN: Speaking of which, let me interrupt your question, if I may. I take it you all saw my e-mail exchange with technical staff about that the technical staffer who was working on the air modeling issues or on air quality issues had a family issue? So we may -- we probably won't receive any additional comment from technical staff on that issue. I just want to make sure you all saw that --

MS. ROSENFELD: I did see it.

MR. GROSSMAN: -- exchange and had no problem. Okay. All right. Go ahead.

BY MS. ROSENFELD:

Q This case requires the Board of Appeals to make a number of findings --

A Uh-huh.

Q -- and Mr. Grossman will provide the Board with a report and recommendations based on the testimony and

evidence that's provided to him in this case. Are you generally familiar with the size and location of the gas station at issue in this case?

A Yes, I am.

Q Among other findings, the Board of Appeals must find that the proposed gas station, quote, will not adversely affect the health or general welfare of residents, visitors, or workers in the area at the subject site, irrespective of any adverse effects the use might have if established elsewhere in the zone, end quote. Do you know what the subject site is in this particular case?

A The subject site is the proposed gas station, and I have been at the site a number of times, and I'm familiar with its location, including its relationship to adjoining residential properties. I'm aware that the site is surrounded on two sides by buildings and, and that there will be a wall to the south of the gas station. So --

Q And do you understand the subject site to include the mall parcel itself that's been discussed in this case?

A Yes, that's my understanding, that it includes the entire mall parcel, the adjoining areas, the swim club, and the school --

Q And --

A -- the Stephen Knolls School.

Q And any of the adjoining homes?

MR. GROSSMAN: Well, let's make a distinction here --

THE WITNESS: Yes.

MR. GROSSMAN: -- between the subject site and the neighborhood because --

THE WITNESS: Yeah.

MR. GROSSMAN: -- that's, that's a distinction --

THE WITNESS: The subject site is the proposed gas station.

BY MS. ROSENFELD:

Q Okay. And what is your understanding of the neighborhood?

A I've toured the neighborhood a number of times. I see -- it's a pleasant neighborhood with tree-lined streets. There are homes. I think the nearest home is about 125 feet south of the proposed site, of the site location, and I'm familiar with the location of the swim club and the Stephen Knolls School.

Q And are there characteristics of the subject site or in the vicinity of the subject site that are unique in your view?

MR. GROSSMAN: Well, let me, before you answer that question, you described a portion of the neighborhood as defined. What we have been using -- well, number one, the applicant has suggested a definition of neighborhood

that includes only the mall parcel. The technical staff has suggested a definition of neighborhood that includes the area that you described, to the south and to the west of the mall.

THE WITNESS: Okay.

MR. GROSSMAN: So I think the question that Ms. Rosenfeld asked you was what do you understand as the neighborhood. You then described a portion of it. Do you understand that the neighborhood as defined by technical staff, which we have been generally using, except in terms of needs analysis, which is a whole nother area, but in general, using their description of the general neighborhood as including the mall as well?

THE WITNESS: Yes. I'm confused on one point, I have to say, because you said that Costco's, the applicant's definition --

MR. GROSSMAN: The applicant proposed a definition of neighborhood that was restricted to the mall property.

THE WITNESS: Okay.

MR. GROSSMAN: The technical staff of the Maryland-National Capital Park and Planning Commission recommended a definition of neighborhood that extended beyond the mall and included properties to the south and southwest of the mall, which you described as a pleasant --

THE WITNESS: Yeah.

MR. GROSSMAN: -- residential area.

THE WITNESS: Okay. So one point of confusion that I have --

MR. GROSSMAN: Yes.

THE WITNESS: -- on this subject is that most of, almost all of Mr. Sullivan's findings are based on concentrations at the units surrounding the mall. I don't understand. So is that a de facto acceptance that the neighborhood, that the surrounding residential --

MR. GROSSMAN: He measured an area which I guess he was contracted to measure --

THE WITNESS: Okay. Well --

MR. GROSSMAN: -- and I don't know that it's a de facto acceptance. I think I have said and I would intend to accept as the definition of the neighborhood what technical staff recommended. Yes.

MR. GOECKE: We would stipulate to that definition.

MR. GROSSMAN: Okay. So the applicant has accepted that also. So --

THE WITNESS: Okay, great.

MR. GROSSMAN: -- to me, it makes, it makes much more sense, in terms of evaluating those who are going to be most affected --

THE WITNESS: Yeah.

MR. GROSSMAN: -- as to not stop the limit of the definition of neighborhood at the mall itself but also to include those who are in the close proximity and those residences.

THE WITNESS: Okay. So we're all on the same --

MR. GROSSMAN: So, yes, the --

THE WITNESS: -- we're all on the same page.

MR. GROSSMAN: We're all on the same page.

THE WITNESS: Right.

MR. GROSSMAN: Okay. I just wanted to make sure that we're clear on that. All right. So I'm sorry, Ms. Rosenfeld --

MS. ROSENFELD: No. That's --

MR. GROSSMAN: -- I interrupted your questioning.

MS. ROSENFELD: -- quite all right. That's one issue we don't have to dispute any longer.

MR. GROSSMAN: Don't have to fight, right.

BY MS. ROSENFELD:

Q Does the scope of Mr. Sullivan's report include his projected levels of certain air pollutants for the home, the school, and the pool parcels?

A Yes. Yes.

Q And does his report include projected air pollution levels within the mall parcel itself?

A Yes, it does. It doesn't -- there are certain

aspects which were not modeled for the mall itself, but their August 2013 report clearly shows results within the mall, okay?

Q On June 17th, during the hearing, Mr. Grossman asked Mr. Sullivan if he could determine what percentage of certain pollution concentrations would result from the gas station. For your reference that's the June 17th transcript at page 178. Mr. Sullivan said that he could and that he would. Does Mr. Sullivan's August 16th report break out the pollution impact of the gas queues or other gas station sources that would impact receptors at the pool, school, or home location?

A Yes, it -- yes, he does. Yes, it does.

Q And do you have, do you have --

A We have a, I can put that --

Q Can you show that?

A Let's see. I can maybe blow this up a little bit.

MS. ROSENFELD: And, Mr. Grossman, this would be Slide 1 of the PowerPoint --

MR. GROSSMAN: Okay.

MS. ROSENFELD: -- provided by Dr. Cole, and it is Exhibit No. 404(a), and I believe everybody should have a copy of that.

MS. ADELMAN: Thank you.

THE WITNESS: Can everyone see that?

MR. GROSSMAN: I can.
MR. GOECKE: If you go to Slide Show, it'll go full screen.
MS. ADELMAN: When Mark comes back, I think he can make it a bit larger.
THE WITNESS: I think if we just put -- can we dim the lights?
MS. ADELMAN: I think the size is the issue, Hank, but I don't know how to do it.
THE WITNESS: Oh. Oh, okay. How about that?
MS. ROSENFELD: Does that help?
MR. GOECKE: I think if you go up to Slide Show, Dr. Cole, you could enlarge the image of what we're looking at.
MS. ROSENFELD: Right there?
MR. BRANN: No.
MR. GOECKE: In the middle of the, toward the top.
THE WITNESS: Ah, you're right. I forgot about that.
MR. BRANN: If you go to Current Slide.
THE WITNESS: There we go. Thank you.
MS. ROSENFELD: Is that too -- should I turn the lights back on or are you --
MR. GROSSMAN: The lights weren't interfering with me, so yes. I prefer to be able to see my notes, not that I

can read them a day later. So I --
MS. ADELMAN: I hear that it's a little out of focus, Dr. Cole; so let me see if I can work on that a bit. Not much. I guess that's as good as it's going to get.
THE WITNESS: I think -- so --
MR. GROSSMAN: All right.
BY MS. ROSENFELD:
Q So, Dr. Cole, looking at page 1 of Exhibit 404(a), can you show how it is that you can identify the contributions of the gas station to particular pollutants at --
A Well, if I'm understanding the table correctly, which comes from, this is from the August 2013 report, and if I'm understanding it correctly, what Mr. Sullivan has done was to estimate the contribution of specific sources to the concentrations at the, at the various homes, at the school, and at the pool. Here the closest home is shown, the school, and the pool. And this is, by the way, urban; the top one is urban, and you see that of whatever the total level is, the queue contributes five micrograms per cubic meter at the home. That's an attempt to isolate just the impact of the queue. You see it's a little bit higher for the rural case below, but the levels were generally, in the mall area, were much higher.
Q And is there anywhere in his August 13th, August

2013 report that provides a similar breakout of information for the mall parcel itself?
A No, not that I'm aware of.
Q So, in your view, does that make this a complete report?
A Well, if one of the issues was what is the incremental contribution -- in this case, we're dealing with NOx, or NO2, more properly -- and we wanted to know the incremental impact within the part of the neighborhood that is the mall, I would have no -- my reading of the results doesn't show that. As a matter of fact, we requested that recently in a memo, which I believe is part of the record, and the answer was that that work had not been done. Is that -- maybe you can produce that document.
Q And, in fact, is that information available for the subject site, for the special exception area itself?
A No.
MR. GROSSMAN: When you say that information, what information?
MS. ROSENFELD: The breakout of the --
THE WITNESS: The breakdown was done for the receptors, which you see: home, school, pool. A similar breakdown was not done within the mall.
MR. GROSSMAN: All right. Are we talking about just for NO2, NOx, or for everything?

THE WITNESS: Right here I'm talking about NO2 --
MR. GROSSMAN: Okay.
THE WITNESS: -- but I believe that's true for other contaminants as well.
MR. GROSSMAN: Right.
MS. ROSENFELD: And specifically, Mr. Grossman, we're talking about the percentage of the pollution concentrations that would result directly from the gas station.
MR. GROSSMAN: So if I understand your point, Ms. Rosenfeld, you are saying that the Sullivan reports -- well, the Sullivan reports, although they gave figures for the percentage of the pollutants from the gas station at these discrete sites -- the home, the pool, and the school -- did not give those figures for the incremental increase from the gas station for other locations on the mall?
MS. ROSENFELD: That is the question I asked him. I think that's Dr. Cole's testimony --
MR. GROSSMAN: Okay.
MS. ROSENFELD: -- yes.
THE WITNESS: That is my testimony.
MR. GROSSMAN: Okay.
BY MS. ROSENFELD:
Q Do you understand that the applicant has argued that if the predicted levels of certain air pollutions,

based on modeling, do not exceed the federal EPA National Ambient Air Quality --
A I'm having trouble hearing you. Could you please --
Q Okay. I think I'm going to need some water. Do you understand that the applicant has argued that if pollution levels do not exceed the federal EPA air quality standards, that they have met their burden of proof in showing that the proposed station will not adversely affect the health or general welfare of residents, visitors, or workers in the area at the subject site?
A Are you talking there about the paradigm or of the -- why don't you rephrase the question. You're --
Q Is it your understanding --
A Uh-huh.
Q -- that the applicant's position is that if they satisfy or fall below National Air Quality Standards, that there will be no adverse health effect on residents, visitors --
A Yeah, okay, right.
Q -- and workers at the site?
A Okay. I believe that is their -- it's my judgment that that is the paradigm which they've applied to this site.
MR. GROSSMAN: What does that mean? What do you

mean that's the paradigm they've applied to this site?
THE WITNESS: What I mean is that their contention is that if they can show that they meet EPA's National Ambient Air Quality Standards --
MR. GROSSMAN: Right.
THE WITNESS: -- that they have met the burden of proof.
MR. GROSSMAN: Okay. And was your question --
MS. ROSENFELD: That was my question.
MR. GROSSMAN: Okay.
MS. ROSENFELD: Yes, he answered --
THE WITNESS: That --
MS. ROSENFELD: -- he answered my question.
THE WITNESS: That doesn't mean I agree with it.
MR. GROSSMAN: Okay.
BY MS. ROSENFELD:
Q And in your professional judgment, does Mr. Sullivan's analysis provide a reasonable basis for the Board of Appeals to conclude that the special exception will fall below or meet the EPA National Air Quality Standards for certain pollutants?
MR. GROSSMAN: Well, the problem with that question is it has will fall below or meet. You have to choose one or the other in the question then.
BY MS. ROSENFELD:

Q In your opinion, will they fall below EPA National Air Quality Standards?
A I think what you're asking is, is there -- does the modeling analysis which was done, is it sufficient to show that they've met the standard that they've accepted --
Q That's correct.
A -- the air quality standards. My answer is no.
Q Okay. And do you have specific reasons for reaching that conclusion?
A Okay. Number one -- and remember that the model that they're using is EPA standards, meeting or not; so there's a certain obligation that goes with that to follow EPA guidance in determining that answer -- so number one is, by Mr. Sullivan's admission, he did an analysis and showed that the area should be classified as rural, meaning using rural dispersion coefficients. He's done the analysis that shows, following EPA guidance, that the site should be classified as a rural dispersion site, using dispersion coefficients. That's important because rural dispersion coefficients are more conservative, give you higher numbers. So if you go to urban, the numbers, the predicted concentrations will be lower, okay? So the answer is he did not follow EPA guidance.
MR. GROSSMAN: Well, do you disagree with his -- he testified that EPA guidance, and he pointed to a number

of provisions in the EPA guidelines for the proposition that you do, you look at the modeling overall technique but then you modify it to get as close to truth as you can, and that's what he says he did when you're talking about a mall area, which is urban in that immediate area of the mall.
THE WITNESS: Yeah.
MR. GROSSMAN: Do you disagree with that statement?
THE WITNESS: Okay. Let me, let me respond. Mr. Sullivan, in his November 2012 report, looks into that issue and uses some professional judgment. And, you know, this is a very difficult area because you've got a transition zone between something that's more suburban rural and something that's urban, which has a number of characteristics, which affect the turbulence in the atmosphere, okay? So he thought about it and wrote an interesting paragraph in his November report that states he felt that this particular site, the dispersion would fall somewhere between urban and rural, in other words, an intermediate value.
MR. GROSSMAN: Right.
THE WITNESS: So, unfortunately, he didn't do that in his modeling. He's relying primarily on -- I mean, he's presented both rural and urban --
MR. GROSSMAN: Right.

THE WITNESS: -- results, but I think it's fair to say that his conclusions tend to favor the urban dispersion coefficients, but he didn't --

MR. GROSSMAN: Well, but let's get to my direct question --

THE WITNESS: Yes.

MR. GROSSMAN: -- that is, do you disagree -- you said that he didn't follow EPA guidance --

THE WITNESS: Right.

MR. GROSSMAN: -- and then he testified that he is following EPA guidance because they say that even though there's this general overall rule about characterizing the three-kilometer radius, that you also want to get closer to the truth by more accurately describing your area, and so he said he followed that guidance. Do you say he did not follow that guidance?

THE WITNESS: No, he did not follow that guidance because he made an assertion about what that guidance would be. He said the value is going to lie between urban and rural, would be the best approximation.

MR. GROSSMAN: Right.

THE WITNESS: So that, apparently, is his response, as he's written very clearly -- and I think it's a fair statement -- that it's his response to the guidance that you just described, some discretion for professional

judgment in a complex situation.

MR. GROSSMAN: For part of it, but others, where he had more specific areas that he was measuring, for example, right at the loading dock, that sort of thing, where he didn't, where it's directly on the mall property, he had a different, a different standard that he applied. Are you saying that he is not following EPA guidance in doing this, or is that exactly what EPA asks you to do?

THE WITNESS: EPA has a specific, which he spelled out very beautifully, the whole procedure. He then explained how he followed it. He has a nice diagram. How do I -- this is from his report, and he looked at the three-kilometer circle --

MR. GROSSMAN: Right.

THE WITNESS: -- found that most of it was qualified as rural.

MR. GROSSMAN: Right.

THE WITNESS: EPA guidance says if it's mostly rural, you need to use dispersion unless, unless there are circumstances. So, yes --

MR. GROSSMAN: Well, he says there were circumstances. He says --

THE WITNESS: Yes.

MR. GROSSMAN: -- that you've got a huge urban qualifying mall here, and you're talking about properties

that are right next to it. And I'm trying to get from you whether or not you think he is incorrect in applying the EPA guidelines in that, in that fashion, to try to get -- to try to somehow take into account the fact that you're right next to an urban-styled object: a mall.

THE WITNESS: Okay. The answer has two -- the question has two answers.

MR. GROSSMAN: Okay.

THE WITNESS: First, I think he followed the guidance in terms of the judgment which he exercised. He looked at trajectories, and he said some of them are, you know, come into the mall from rural areas or areas that would be characterized as rural under EPA guidance, some are mostly over the mall, and he then said, well, let's use the best -- my best judgment would be an intermediate value. So that's -- the answer is he did look at that. I think he was diligent in doing that little analysis. Part 2 answer, did he incorporate that judgment into the modeling? The answer is, no, he did not.

MR. GROSSMAN: Okay. All right. Ms. Rosenfeld.

BY MS. ROSENFELD:

Q And to follow up, did he incorporate that in his modeling in the 2012 report?

A No. He used -- in the November 2012, he relied, in his isopleths figures, on the rural results; he followed

that in the November report, and he, however, presented findings for the receptors around, around the, around the mall, the homes, et cetera. He also presented urban results. So he showed both. I don't necessarily disagree with that. He showed both.

Q And, Dr. Cole, when you talk about receptors, can you explain what a receptor means?

A Well, there are two definitions. One is the modeling definition, which is you make a grid or you put, or a monitoring grid, you put out monitors or you model the intersections of grid lines or the middle of grid lines, depending upon how you want to do it, and you see what the model shows you for each of those receptors.

However, there's another meaning for the word receptor, and that is, people, people who are affected. I don't think I have to be a medical expert to say that when you breathe, you're breathing the ambient air. So receptors are people who breathe ambient air, the impact of whatever emissions are in the area.

Q So when you talk about the pollution concentrations at a particular receptor in a study, that would translate into the concentrations that a person standing at that location at that point in time would be breathing; is that -- if the model were translated into real life?

A Well, you have to be wary of the averaging time of the standard and the averaging time of the modeling. There are one-hour standards, eight-hour standards, 24-hour standards, and annual standards. So in terms of, you know, in terms of -- you have to look at the specific, okay? So for NO2, for example, I think the critical factor is the one-hour modeling results, okay?

Q We were going through the reasons that you --

A Oh, right.

Q -- thought that Mr. Sullivan's report would not provide a basis to conclude that --

A Right.

Q -- air pollution --

A The first was, we talked about dispersion coefficients.

MR. GROSSMAN: I don't think you finished your question.

BY MS. ROSENFELD:

Q That the air pollution levels from the gas station would not meet federal EPA standards and --

A Uh-huh.

MR. GROSSMAN: Do you think this is a good time, actually, for a five-minute break before you continue, because it's --

MS. ROSENFELD: It's certainly fine with me, sure.

MR. SILVERMAN: Sounds like a good idea, yes.

MR. GROSSMAN: All right. So we'll come back at 20 to 12:00.

(Whereupon, a brief recess was taken.)

MR. GROSSMAN: Ms. Rosenfeld.

MS. ROSENFELD: Yes. Thank you.

BY MS. ROSENFELD:

Q Dr. Cole, when we left off, we were talking about a summary of the reasons why you thought that Mr. Sullivan's analysis would not provide a reasonable basis for the Board of Appeals to conclude that the special exception would meet the EPA National Air Quality Standards, and you had talked briefly about the difference between the urban versus rural coefficients. Are there other grounds for your conclusion?

A Yes. Yes, there are. The second area is that Mr. Sullivan, in estimating motor vehicle emissions, used an obsolete model called MOBILE6. EPA's approved model for emissions is called MOVES2010. I can get into that later, but certainly the analysis with MOBILE6 has the effect of reducing predicted concentrations of both PM2.5 and NO2.

I bring up those two pollutants, and will repeatedly, because in the case of NO2, very strong evidence that there's an exceedance of the standard from Mr. Sullivan's documents and, secondly, PM2.5 annual is very, in his final report, is very close to the standard.

So anything such as emissions, if you underpredict emissions, you're going to have problems accurately predicting concentrations for those mobile source emissions.

MR. GROSSMAN: Mr. Sullivan testified that he wanted to use MOVES model but he was unable to get certain parameters from Council of Governments which were required --

THE WITNESS: Well --

MR. GROSSMAN: -- to apply it. Do you disagree with that or --

THE WITNESS: I have two responses. One is that the model was issued in an earlier form, the MOBILE2010, back in 2010, number one. Guidance was issued at around that time as well. Secondly, there are other ways to get at the data, I believe, that, or to get at the answer, that Mr. Sullivan has acknowledged but did not follow through on.

MR. GROSSMAN: What are you talking about?

THE WITNESS: Okay. So, for example, in the area of particulates, he acknowledged that idling cars, when you apply MOVES as opposed to MOBILE6, you get an answer that's 10 times higher.

MR. GROSSMAN: Right.

THE WITNESS: For NO2 the correction would be a factor of two. Now, that's Mr. Sullivan's assessment.

MR. GROSSMAN: Right.

THE WITNESS: Okay? But he didn't follow through and use those corrections, or corrections between MOBILE6 and MOVES which he refers to, but he didn't actually do that.

MR. GROSSMAN: Well, that's another question, but my question is, he's testified that the reason he didn't use the MOVES model was because he couldn't get certain information that is necessary to apply that model from the Council of Governments. That's my recollection of his testimony. Do you disagree with that testimony? Was that information available from the Council of Governments, and is it needed to apply the MOVES model?

THE WITNESS: I think there are ways of getting the data. He said in one of his testimony, he said default values could be used, he didn't want to use default values, but he didn't explain why he didn't want to use default values. That's for MOVES2010. So there are other ways to use MOVES and --

MR. GROSSMAN: Well, first, answer my question. Do you disagree with his statement that he was, that the information necessary to apply MOVES is, that is necessary to apply it is not available or he was unable to obtain it and he cannot obtain it from the Council of Governments yet?

THE WITNESS: That is his assertion.

MR. GROSSMAN: Well, I'm asking you whether his --

THE WITNESS: Well --
MR. GROSSMAN: Did you check? Did you check with the Council of Governments to try to find out if that information was available?
THE WITNESS: I take his word that the kind of information that he's talking about was not available. I don't take a position on whether there were other ways to simulate the data. That's -- the explanation for that or the rationale for that or the reason why he didn't do it is not for me; it's for him --
MR. GROSSMAN: Well --
THE WITNESS: -- he's the one that's doing the analysis.
MR. GROSSMAN: But right now it's for you, sir, because I'm asking you that question as an expert. Do you think that it is improper to not use the MOVES model when he could not get the data that he felt was necessary from the Council of Governments?
THE WITNESS: Okay. I'm going to answer in two parts. I don't know, is the first answer.
MR. GROSSMAN: Okay.
THE WITNESS: Whether or not he could have obtained that data or simulated it in another way, I don't know the answer. Secondly, he said his, gave his best judgment for correction factors. That would have been

another approach, but he has testified that he did not apply those correction factors.
So, once again, we're in a situation where he acknowledges there's a problem, even comes up with suggestions for a solution in the case of dispersion coefficients, intermediate, in the case of this, apply correction factors, but he doesn't follow through incorporating them into the results that he presents.
MR. GROSSMAN: I understand what you're saying but that doesn't really -- once again, you haven't really answered my question, but I'm going to let you -- I'm going to leave it like that.
THE WITNESS: I said I don't know the first -- I repeat, I don't know. The answer is --
MR. GROSSMAN: Okay. I'll take your I don't know. Ms. Rosenfeld.
BY MS. ROSENFELD:
Q And what other areas did you base your conclusions on with respect to the report?
A Well, the next thing was I don't believe that the modeling, the emissions modeling, takes into consideration the level of congestion (a) current during, especially during peak periods; and, secondly, the impact of placing a gas station, with queues, with delivery trucks, on -- the congestion -- in the area of the mall, in particular; so,

and there, as I will explain later, there's a very strong relationship between levels of congestion, number of cars, vehicle speeds, and emissions. If you get that wrong, if you don't have the right level of traffic, you're not going to have the right level of emissions. I will get into that in detail. So that's the third area.
The fourth thing I find as a huge problem is that he made an assumption, apparently based on back of the envelope or picked it out of the air, that people exposed to gas station queues or the level of pollution in that area would only be exposed for 20 minutes. He --
MR. GROSSMAN: In which area? Exposed in which area, would only be exposed for 20 minutes? Which area are you talking about, sir?
THE WITNESS: In the area of the gas station and its immediate --
MR. GROSSMAN: Oh, people moving through the gas station?
THE WITNESS: People moving around in the parking lot and the gas station, whatnot. Some people, for example, may be there for -- someone who's a service employee or something may be there for a lot, for a whole hour or for two hours or for five hours or 10 hours. This is not -- the standards are written by EPA to be a one-hour concentration. I have never seen this done, this sort of thing done, and if

you're going to --
MR. GROSSMAN: I'm sorry. You've never seen what sort of thing done?
THE WITNESS: This kind of reduction based on assumptions about exposure. The standard is a one-hour standard.
MR. GROSSMAN: Right. I think that --
BY MS. ROSENFELD:
Q Dr. Cole, could you explain what reduction you're talking about? Quantify what it is --
A Okay.
Q -- that you're talking about.
A Okay. The normal way of looking at whether or not you meet a standard is you calculate, based on your modeling, the hourly concentration, in this case, for an hour. In this case, he, what Mr. Sullivan done was assume that no one would be exposed for a whole hour; so he divided his, the reduced air emissions by two-thirds.
MR. GROSSMAN: Right. I think from, if I recall the testimony, it is as, in terms of people passing through the queue to get through the gas thing. I think that's what's applied to. It's not clear here yet, an argument or an issue, as to whether, for the workers who are there, whether that's OSHA standards or EPA --
THE WITNESS: Well, how about people --

MR. GROSSMAN: Well, let me finish this, sir -- whether it's OSHA standards or EPA National Ambient Air Quality Standards that apply to them, but I think that the 20-minute figure, if I recall, is based on how long it takes to get through the queue of a person --

THE WITNESS: Okay.

MR. GROSSMAN: -- getting gas there. So I think that's where that comes from.

THE WITNESS: Okay. So what he did was he assumed 20 minutes exposed to what's in the queue in the gas station area, right?

MR. GROSSMAN: Right.

THE WITNESS: For the rest of the hour, 40 minutes, he assumes background concentration and that neglects the fact that someone might buy gas, take their car, search for a parking space, get out of the car, move to wherever, two or three shops or one shop or wherever they're going, they got the kids with them, they got the, on the way back, they've got a shopping cart that they have to load into the -- now, those parking lot areas are going to be way higher; in fact, his own, Mr. Sullivan's results show that in the area of the mall, the concentrations are way higher, let's say, for NO2 than they are background. So you've got people who may be exposed for 20 minutes at the queue, but they may be moving to other places.

So putting aside the OSHA issue, I think there's no evidence that's produced here to show the validity of the assumption that he used.

MR. GROSSMAN: All right. So you say the 20-minute assumption is potentially understating the exposure of --

THE WITNESS: Absolutely, yes.

MR. GROSSMAN: -- at least some people in the area? I understand.

THE WITNESS: Yes. Yes.

MR. GROSSMAN: I don't know that there's no evidence, but I understand --

THE WITNESS: And there's another, there's another issue, too, which I can get into if you want. When you look at a shorter averaging period, it's well-known in air pollution meteorology that the exposures in a smaller time -- the maximum exposures for a smaller time period are going to be higher. So you can't have it both ways. If you're going to reduce the exposure time, you also have to look at higher maximums, and there's scaling factors that EPA recommends to use when you go from one averaging period to another. He did not do that.

MR. GROSSMAN: Okay.

THE WITNESS: So he's trying to have it both ways.

MR. GROSSMAN: Okay.

BY MS. ROSENFELD:

Q Dr. Cole, are you aware of anywhere in the EPA regulations or guidance that would support the reduction of these concentrations based on exposure, the NO2 concentrations based on exposure?

A I'm not aware of that.

MR. GROSSMAN: Let me, which -- the NO2 concentrations under, are you talking about the 24-hour, the one-hour? Which are you talking about?

MS. ROSENFELD: The one-hour, for the --

MR. GROSSMAN: Okay.

MS. ROSENFELD: -- one-hour NO2 standard.

MR. GROSSMAN: Okay.

THE WITNESS: A one-hour standard in my history on these subjects is a one-hour standard.

BY MS. ROSENFELD:

Q And so --

A And to make another assertion without supporting evidence is, in my opinion, and without considering the impact on maximum concentrations over further periods, is just a mistake.

Q Does Mr. Sullivan's analysis try to conflate emissions modeling with dosage or exposure?

A I don't understand.

MR. GOECKE: Objection. He doesn't know the

intention of Sullivan's report.

MR. GROSSMAN: I don't know if she meant in terms of intention, but I'm not sure I understand the question anyway. You're saying, does he conflate these two concepts in some way? I'm not sure which part of his testimony you're talking about and what exactly you mean by the question.

MS. ROSENFELD: The two-thirds reduction of the NO2 --

MR. GROSSMAN: Right.

MS. ROSENFELD: -- does he, is that reduction based on his assumption of the exposure level that a person would have?

MR. GROSSMAN: Do you know the answer to that question?

THE WITNESS: I don't know what he based that on, frankly --

BY MS. ROSENFELD:

Q Okay.

A -- it's an assumption.

MR. GROSSMAN: And he's testified he doesn't feel there was a sufficient, or any evidentiary base for that assumption. Whether there is or not is a separate question, but that's this witness's testimony.

BY MS. ROSENFELD:

Q And, Dr. Cole, are there other points that you wanted to make in terms of just summary deficiencies?
A Yes, there are a couple general points. One is that there have been numerous revisions of the modeling and, in some cases, the documentation for the changes that have been made are not clear, in my judgment. Also, this gets to the question of uncertainty.
In any analysis, the standard norm in science is to state what your errors could be, what your uncertainties are, and I see none of that in Mr. Sullivan's reports. It's critical because, when there are many, many uncertainties -- and I'll be discussing more uncertainties --
MR. GROSSMAN: You're not going to get into the Heisenberg uncertainty principle.
THE WITNESS: No. No. No, no, no, no. I'll give you an aside later about Heisenberg.
MR. GROSSMAN: I don't think I can take off-the-record asides from witnesses, but it's okay.
THE WITNESS: Later, later, when the case is over. When you have many uncertainties -- and in this analysis, there are so many uncertainties: predicting emissions, predicting what atmospheric turbulence, which is a very complex issue, will do -- one way to deal with it is to err on the side of conservatism, to use those assumptions and methods which will cover the potential for errors and

uncertainty, because -- and the reason why you want that safety zone, let's say, is because the question applies to the protection of human health. If you're wrong and you're over and you don't do something, you haven't harmed public health, but if you do something that in fact harms health, you can't reverse that.
So there's a -- and I was glad, when we first started the dialogue to arrive at a protocol here, that Mr. Sullivan was, used many conservative principles. I am deeply concerned that when subsequent modeling, such as the correction of the background for NO2, shows that there's an exceedance, that Mr. Sullivan pulls away the conservancy. He's done that in a number of cases. We can talk about that, but the general --
MR. GROSSMAN: He says it's less conservative but it's still conservative, is what he says.
THE WITNESS: Yes. So I would argue --
MR. GROSSMAN: More accurate, I think, is what --
THE WITNESS: Well, I don't, I'm not accepting that. When you have an emissions factor that's either 10 or twice below what EPA standard emission model is, that's not conservative. When you, when you don't adequately account for congestion in your emissions, that's not conservative. So I'm not saying that about accurate. What I'm saying is there's a great deal of uncertainty.

I can tell you, as someone who's done modeling, that there are many choice points. All you have to do is read either the guidelines for AERMOD or the guidelines for modeling. There are so many places where you can make Choice A or Choice B, and every one of them affects the results. Now, I'm not going to judge every single thing that he did, but I can say that your choice on all of those points adds to the uncertainty, and in a situation where you have uncertainty, I would argue that you stay with conservatism. I'm a liberal, but in this case, I'm advocating conservatism, okay?
BY MS. ROSENFELD:
Q Dr. Cole, we've spent a great deal of time in this case --
A Oh, let me add one thing, please.
Q Sure.
A Having looked at all of the many reports and the changes that I've talked about, places where I feel there's inaccuracy, places where I feel there's a lot of uncertainty, or the retreat from conservatism, I believe that these, that the problems, that the deficiencies and the uncertainties, individually and more so in combination, do not give you or the appeals board the green light on this particular case. They have not made the case that they are meeting EPA standards, okay, and in fact, I have a contrary

opinion.
I feel, I believe, it's my judgment that the evidence that they have generated supports the contention that the NO2 one-hour standard would be exceeded and, potentially, the PM2.5 annual standard would be exceeded -- (a) the report doesn't rule it out with sufficient evidence, accounting for uncertainties, and (b) tends to, in a number of important instances, underpredict emissions and overpredict, in my opinion, dispersion. Those kinds of things reduce predicted concentrations. And the fact that changes were made once results showed exceedances is deeply concerning to me as a scientist.
MR. GROSSMAN: Okay.
BY MS. ROSENFELD:
Q Dr. Cole, we've spent a lot of time in the case talking about air modeling --
A Uh-huh.
Q -- and before you get into the real substance of your testimony, I want to make sure that we all are using the same terminology in the same way, at least with respect to your testimony.
A Okay.
Q Would you just give us a brief review of air dispersion and air quality modeling before you get into more detail?

A Is it possible for me to go up there?
MR. GROSSMAN: Yes, or you can use my wanted laser pointer --
THE WITNESS: Beautiful.
MR. GROSSMAN: -- which the government invested 10 or 12 bucks.
THE WITNESS: Okay. How do I do it?
MR. GROSSMAN: There's a button on it. Just don't point it at anybody. Right on top.
THE WITNESS: Oh, I got it.
MR. GROSSMAN: Yes.
THE WITNESS: Be good. I won't point it at you because --
MR. GROSSMAN: That's good, yes. That's --
THE WITNESS: Okay. So this is -- I want to talk about area sources, okay, because that's what we're really talking about here.
BY MS. ROSENFELD:
Q And, Dr. Cole, before you move forward, this would be page 2 of Exhibit 404(b) --
A Okay.
Q -- the figures on --
A Right.
Q -- on that exhibit.
A The first -- the upper panel here is sort of a

bird's-eye view looking down. It's the lateral, we're looking at lateral spread of the plume. Here are the concentrations of a low-level area source, and we're talking about fairly low-level emissions from automobiles and whatnot. So the concentrations near the surface and in the area of the source tend to be the highest. Then, when you go out, the effect of wind and the effect of turbulence spreads the plume in the horizontal.
MR. GROSSMAN: So the darker area is the heavier source --
THE WITNESS: Yes. Yes.
MR. GROSSMAN: -- heavier concentration?
THE WITNESS: I didn't want to put numbers on here, but the darker it is, the more concentrated. Right?
MR. GROSSMAN: Okay.
THE WITNESS: And now we go to the vertical cross section, and the same thing is true under most circumstances: the concentrations are highest near the source; they tend to spread in the vertical. And so that the concentrations, because of both vertical spread and lateral spread, are diminishing away from the source. That's a basic tenet. Does anyone have, do you have questions on that?
MR. GROSSMAN: No.
THE WITNESS: Okay. There's something else,

though, that affects dispersion, and that is, atmospheric turbulence. Okay. Turbulence is one of the most complicated macroscientific puzzles known to the scientific world. It depends on whether the surface is hot or cold, whether the surface is rough or smoother. You never know in a unit of time what wiggles and waggles you have. The wind has gusts, which is another function of turbulence. In some cases, there may be an inversion over the, at some level above the plume and that acts as a lid, which keeps concentrations higher. I tried to make this diagram so that the concentrations would trail off more slowly, because there's less vertical headroom for the contaminants to disperse into, okay? So now --
MR. GROSSMAN: How did you determine the pattern of the squiggly lines and --
THE WITNESS: Oh, that's a great question. I'm glad you --
MR. GROSSMAN: I thought they looked somewhat like, Dr. Adelman would say, the pattern that a slime mold might --
THE WITNESS: Yes.
MR. GROSSMAN: -- might make as a --
THE WITNESS: Right. I have an acknowledgment to make, that it was late at night and I just used the computer to make any squiggles that I could.

MR. GROSSMAN: I see, random squiggles.
THE WITNESS: Random squiggles, and I wasn't happy because it looks so crude. It doesn't, I haven't -- you know, you can tell by my slides that I like things to look okay.
MR. GROSSMAN: Yes.
THE WITNESS: This does not look okay, but there's a point in that, in that incorporation of turbulence into models is about as primitive, in my judgment, as the squiggles on the screen. It's very hard to know exactly what's going on. It's affected by so many different things, the history of the air parcel, is it going over the suburbs, is it going over a city, what happens when it hits the parking lot, what happens when there are buildings present, which greatly adds to the uncertainty and to the turbulence. In this case, we have a building to the north, we have a building to the east, very near the -- the one to the east is very near the gas station. How does that affect dispersion? Are there cases where that actually leads to more concentration?
BY MS. ROSENFELD:
Q And, Dr. Cole, could you go back to the prior figures just for a moment?
A The prior slide?
Q Yes. And these are very basic questions, but if

there's more wind speed, would there be faster dispersion?
A Yeah. I have a slide on that, actually. Let me, let me just answer it. Okay. Picture this in your mind. This is -- I've done this in my classes, but instead of a smokestack or a car, pretend it's a kid with a bubble machine, okay? They actually sell bubble machines; you don't even have to blow it anymore. I mean -- so here's the kid with the bubble machine and there's no wind, okay? The bubbles are sort of amassing around; there's a little bit of turbulence in the area. So the kids are looking marvelously at the bubbles, and they're bursting, of course. Now let's increase the wind speed to two miles an hour. These bubbles then are stretched out. There's more air that's moving by.
So the effect of wind speed is to reduce concentrations, and in every model a basic tenet is that concentrations are inversely proportional to wind speed. So the higher the wind speed, the lower the concentrations, because you're stretching the atmosphere. Another way of saying it is you're --
MR. GROSSMAN: Right.
THE WITNESS: -- providing more dilution air per unit time.
MR. GROSSMAN: Right.
THE WITNESS: Okay? Does that --
BY MS. ROSENFELD:

Q Well, one other question. There's been a lot of discussion about urban versus rural, and can you explain how urban coefficients and rural coefficients affect the dispersion of air pollution, if they're a factor?
A Okay. Let's take -- the rural case is a case where you have less, the technical term is surface roughness elements are smaller, are lower, a grass lawn, very small little things that affect the roughness. So below that surface roughness you have turbulence, and above it you can find a place where the wind speed is zero, but this is too much, I'm sorry, this is too much technical detail. Let me -- your question was?
Q Really a comparison. Why --
A Okay.
Q -- why is the difference important?
A Right. Rural is relatively smooth, okay? A lake is smooth in parts, less physical turbulence, okay? Mechanical turbulence is a result of the resistance of objects to the moving wind. Urban, you've got buildings; you've got -- and in this case, you have buildings very near -- you have a surface that has automobiles or trucks; you have, admittedly acknowledge, I acknowledge that the dispersion is better in urban areas and that's why, when you use the urban coefficients, you get lower concentrations, because there's more spread of the atmosphere, there's more

turbulence to spread the pollutants.
So the complicating factor is that air -- any fluid has a memory. So that this air that's moving from one kind of topography to another, there's a transition zone. Now, I've studied transition zones in the area of shorelines. They have a profound effect on turbulence.
MR. GROSSMAN: Explain what you mean by fluids have a memory. I don't understand that.
THE WITNESS: Okay. Good question. In other words, you don't suddenly -- the air, right, the air is moving downwind; the air is moving in a certain direction. It's flowing over a rural surface, let's say, and then suddenly it comes to the edge of a more urbanized area.
MR. GROSSMAN: Right.
THE WITNESS: There is -- what happens is that the turbulence initially affects the lowest part of the atmosphere. The area affected grows as the air moves further into the urbanized area. So there is a transition zone between, and it may be --
MR. GROSSMAN: There's more of a lag in the effect than a memory.
THE WITNESS: Yes, absolutely. This is not an exact comparison, but if you look at this, the vertical area here downwind of the source, you see that it takes some time for the turbulence to disperse the plume upward. Similarly,

the air coming in from the rural area would be less turbulent.
MR. GROSSMAN: Wouldn't your diagram have to be reversed then? Shouldn't it be darker on the top if it takes longer to disperse it --
THE WITNESS: Well, it --
MR. GROSSMAN: -- based on the, based on the change?
THE WITNESS: I'm sorry. What?
MR. GROSSMAN: Your diagram on the board --
THE WITNESS: Yeah.
MR. GROSSMAN: -- shows it being lighter, generally, towards the top, further away from the ground. Is that correct? Am I seeing that correctly? A lighter color, that means --
THE WITNESS: Right. Yeah, sure.
MR. GROSSMAN: -- meaning a lower concentration.
THE WITNESS: Yeah.
MR. GROSSMAN: Shouldn't it be darker there?
THE WITNESS: No.
MR. GROSSMAN: Because, if you're, if you're telling me that as it meets the changing surface, it disperses faster at the low level and then has a lag at the higher level, shouldn't the higher concentration remain at the higher level longer and therefore you should be showing

darker at the top than lighter?
THE WITNESS: All right. Let me back up. I wish I had one of those pads to draw a picture.
MR. GROSSMAN: You can use the laser pointer.
THE WITNESS: Okay. Can I ad lib?
MR. GROSSMAN: Can you ad lib? Sure. This is an ad lib. This is what we're all about. We're all ad lib.
THE WITNESS: Okay. Good. Thank you.
MR. GROSSMAN: You need to draw a picture on here?
THE WITNESS: Yeah. I'm going to go to this, and I'm going to, how do I get -- all right. Now I want to go to New and Create, and bear with me. Where's the way out thing?
MR. GROSSMAN: Did you understand my question?
THE WITNESS: Yeah, I understand your question. I want to address it here. How do I get rid of these boxes?
MR. GROSSMAN: I don't know.
THE WITNESS: I can't find -- oh, here we are. Let's see. Slide way out. Ah. All right. Let's go here and let's get rid of this. All right. So I'm going to draw a surface.
MR. GROSSMAN: I'll tell you what. Rather than having you do it here, you can do it over the lunch hour for me and show me later, if you want to answer my question later.

THE WITNESS: Okay.
MR. GROSSMAN: Okay?
THE WITNESS: What I'm saying -- let me see if I can put it into words.
MR. GROSSMAN: Okay.
THE WITNESS: Stop thinking about concentrations for one minute, and let's just think about turbulence.
MR. GROSSMAN: All right.
THE WITNESS: So you've got air moving from a relatively smooth area to a rough area.
MR. GROSSMAN: Right.
THE WITNESS: The turbulence starts to build, to erode the smoothness, as a way of saying, but it builds over distance. So near the source you have, yes, you have concentrations near the surface, but the overlying air is relatively smooth. So, in other words, the dispersion can't take full advantage of the urban turbulence until that turbulent, that boundary layer builds up and that takes some distance.
So near the source you're going to, it's true, you're going to have a lot of turbulence down at the surface, but you're going to have that air moving above that boundary layer, which is still rural, has less dispersion. So you can't take full credit for urban dispersion near the source if the wind is blowing from a relatively smooth area

to a rougher area. I don't know if that makes sense.
MR. GROSSMAN: I understand. I'm not sure that answers my question, but I understand what you're saying there. So let's go on. My -- I don't think my question is that important in the grand scheme of things. So --
THE WITNESS: Okay. Let me get back to --
BY MS. ROSENFELD:
Q Mr. Sullivan's report references a term called AERMOD. Can you explain what that is?
A Okay. I want to get the acronym. AERMOD stands for American Meteorological Society, AMS, slash Environmental Protection Agency, EPA, Regulatory Model. It's now the preferred recommended modeling. To Mr. Sullivan's credit, he used the standard; he used the gold-standard model, AERMOD. It has many improvements over the older models, okay? So he's used the proper model.
MR. GROSSMAN: Okay.
THE WITNESS: All of these models, including AERMOD -- now, the, all models, as I said, the larger the emission rate, the higher the concentration. So there's a proportionality between emissions and concentration.
MR. GROSSMAN: Right.
THE WITNESS: I've already said the higher the wind speeds, the lower the concentrations, inverse.
MR. GROSSMAN: Right.

THE WITNESS: Thirdly, the more turbulence, the faster the pollution disperses.
MR. GROSSMAN: Okay.
THE WITNESS: AERMOD, the advance that I appreciate in AERMOD more than anything else is the handling of the vertical dispersion. Instead of just sort of taking a stab, as earlier models did, and using a Gaussian, meaning a normal distribution in the vertical, no, AERMOD does a lot better. It says we're going to look at the kind of situation, the kind of surface, whether there's a lot of moisture or not, whether the surface is reflective or not, because if it's reflective, you're not going to get as much heating. Heating has an important impact on turbulence, on convective turbulence. The surface roughness, I mentioned, has an impact on the mechanical turbulence. So that AERMOD uses some very sophisticated understandings of the dynamics of turbulence and uses something called a probability density function; so that instead of just saying Gaussian, it looks at the kind of situation and simulates the kind of turbulence, the size of the turbulent cells, the frequency of wind changes, and all of that comes out of this greatly improved model.
What the model doesn't do well is the situation with discontinuities, because it assumes -- basically, you have to choose parameters that apply to the whole area and

-- so that there's an assumption about (a) steady state, meaning that for the hour that's modeled, the concentrations in it, all of the factors are the same. The second assumption is that you may vary from hour to hour the roughness parameter based on wind sector, okay, but it doesn't specifically incorporate the change in topography or the change in, I'm sorry, not -- it does deal with topography. It doesn't deal with the changes in the surface roughness and other characteristics which affect turbulence. It does, has very good things to deal with topography, such as a plume intercepting a mountain or something like that. It has sophisticated algorithms.

So that, that's a rough summary of AERMOD. However, I want to emphasize one other point: the devil is in the details. There are many bells and whistles. It's part of its sophistication. There are many choice points. The choice points that you make affect the outcome. And so some modelers, for example, would do a sensitivity analysis to see if, how changing certain models would affect the results. From those kinds of analyses, you get a view of the uncertainty --

MR. GROSSMAN: Changing certain models or changing certain parameters of your model?

THE WITNESS: No, you would use the same model. You change --

MR. GROSSMAN: No, no. You said, I thought you said changing certain models --

THE WITNESS: Right. You would --

MR. GROSSMAN: -- but you change certain parameters.

THE WITNESS: Certain parameters to see, well, what if we use this roughness instead of this roughness, what if we assumed a wet surface instead of the dry -- those kinds of things.

MR. GROSSMAN: Right.

THE WITNESS: But there are many choices of representative meteorological data. There are sources of what averaging time you use for the wind measurements. There's just a lot in there and that's one of the reasons why I believe that conservatism is warranted, because you don't -- if you don't do all of these analysis to see exactly what your choices do --

MR. GROSSMAN: Right.

THE WITNESS: -- you've got to have a safety margin. That's my view.

MR. GROSSMAN: Okay.

BY MS. ROSENFELD:

Q Dr. Cole, I'd like to go back now to the points that you raised as your, I think, most significant concerns. The first one was the choice of urban versus rural

dispersion coefficients.

A Yeah.

Q You answered some of Mr. Grossman's questions on that point, but could you go in more detail and explain why you think that the report doesn't accurately reflect which of those dispersion coefficients should be used?

MR. GROSSMAN: The Sullivan report?

MS. ROSENFELD: The Sullivan report.

MR. GROSSMAN: Which one?

MS. ROSENFELD: 2013 --

MR. GROSSMAN: Okay.

MS. ROSENFELD: -- the August 2013.

THE WITNESS: Well, he presents, in his favor, I think it's fair that he presented both urban and rural results. That gives some choice to look at when you're looking at the results. As I said, the more conservative is the rural dispersion coefficients. He does present that, but he, in his judgment, he seems to put the weight on the urban characteristic. He does say in his November report, as I said before, that he feels the most accurate representation would be to choose some value between urban and rural coefficients that would be intermediate between the two, but I don't see evidence that he's applied that principle, which he states is his best judgment. I'm not -- he could have, for example, taken the concentrations from

the urban and the concentrations from the, let's say he took the maximum of each -- in fact, I believe I did this -- and looked at the average of the two as one reasonable hypothesis about where the, where the middle ground is.

MR. GROSSMAN: Well, by having both sides of that, anybody could do that arithmetically, correct?

THE WITNESS: Yes.

MR. GROSSMAN: All right.

THE WITNESS: I would caution, in some of the ways that you would adjust the figures, you need to subtract out background, make the averages and then add the background; or, if you're multiplying by a correction factor, you really need to take out, because that correction factor for MOVES versus MOBILE, for example, applies only to the modeled sources and not to the background. The background is added. So --

MR. GROSSMAN: Right.

THE WITNESS: -- when you make adjustments, you really want to subtract out what's modeled.

MR. GROSSMAN: Okay.

THE WITNESS: Okay?

BY MS. ROSENFELD:

Q Dr. Cole, in your opinion, which would be the most accurate way to model these concentrations? Would it be the urban, would it be the rural, or would it be a combination?

A Okay. You used the word accurate? Okay. I think -- there's two ways I want to answer. First is what might be reasonably accurate, and remember that we're dealing in a very hypothetical realm here. Modeling is not the same as going out and doing a detailed field study of turbulence and all those parameters. It's using data that, in most cases, is your best judgment about approximations.

So the first answer is, in terms of accuracy, is I will -- Mr. Sullivan made a good stab at it. He said, you know, the urban coefficients give you one thing, rural coefficients give you something else, and he felt the best judgment was intermediate, between the two. On the other hand, my view is, if I were doing this analysis, I would say there's so much uncertainty here and we're in a transitional zone that we want to err on the side of safety; we want to do -- we want to have a more conservative analysis so that, in the case of a serious error, we have some protection.

Q Could you go to Figure 3 of Exhibit --

A Of the slides?

Q Of the slides. I believe that's the one.

A Is this it?

Q No. Actually, it's page 6.

A This?

Q Right there, yes. Yes. Is that a figure from Mr. Sullivan's 2012 report?

A It's from his November report.

Q Okay. And I believe you testified earlier that this was prepared consistent with EPA guidance --

A Yes.

Q -- on how to determine urban versus rural --

A Yes.

Q -- is that correct?

A Right. This analysis was, according to the guidelines, how you do, how you make a determination.

Q And, in your opinion, would the more conservative approach be to use the rural coefficients?

A Yes, the more conservative approach. Giving higher concentrations would be more conservative.

Q And can you show what the difference would be between using the urban and rural coefficients, how the results would differ?

A Well, you can compare, yes, you can compare the results that Mr. Sullivan's -- for example, his August report has some comparisons. I think we have some of those. Let's see. This was, this --

MR. GROSSMAN: Let me, while you're cogitating that --

THE WITNESS: Is this urban? This was the urban, or it says urban in yellow, okay? And this is the same modeling emissions and whatnot but is for rural.

MR. GROSSMAN: When Ms. Rosenfeld asked you which is the more conservative approach, you said using the rural coefficients, but I understood you to say before that you thought that Mr. Sullivan made a good stab at getting to accuracy or a splitting the difference.

THE WITNESS: Uh-huh.

MR. GROSSMAN: Are you saying that the more conservative is the rural approach but the more, potentially more accurate approach is to split the difference? Is that, do I understand that correctly?

THE WITNESS: I'm not using the word accurate here. I'm using the word as a reasonable choice --

MR. GROSSMAN: More reasonable approximation?

THE WITNESS: -- given the choices that the modeler has --

MR. GROSSMAN: Right.

THE WITNESS: -- okay? Are those accurate choices? Some cases, yes; some cases, maybe not, but given two alternatives, he did what I think a reasonable person doing an investigation like this would do. He said, sure --

MR. GROSSMAN: Okay.

THE WITNESS: -- look at the intermediate value. My only problem is he didn't apply it.

MR. GROSSMAN: I understand.

BY MS. ROSENFELD:

Q And looking at Figures 9 and 10, just so the verbal record reflects it, what was the urban --

A Okay.

Q -- one-hour NO2 concentration?

A Well, in this diagram he says 168. In another diagram he says 160. I'm not sure what the difference is, but let's take either one. Let's say the urban is 168 or 160, fine, and the rural, you can see, the maximum is 217. Your distinction is important because a 217 is above the EPA standard of 190 for the one-hour NO2 concentration.

MR. GROSSMAN: Right.

THE WITNESS: Okay?

MR. GROSSMAN: So if you were to do your concept of what you think he should have done --

THE WITNESS: Right.

MR. GROSSMAN: -- here but you have to take out the background, too, and then add it back in, what would you --

THE WITNESS: Okay.

MR. GROSSMAN: -- end up being at, your estimate of the more accurate way of estimating this?

THE WITNESS: I think I did that somewhere. Okay. Well, let's see. Okay. Here it is right here. I believe this is the slide.

MR. GROSSMAN: All right. Let me see which slide

that is.
MS. ADELMAN: 18, I think, is --
THE WITNESS: Oh, this was, I'm sorry, this was for MOVES. This is not right. I thought I had done that and incorporated here. Let me, because I did exactly --
MR. GROSSMAN: What I'm saying, yes.
THE WITNESS: So if you take 217 --
MR. GROSSMAN: Right.
THE WITNESS: -- for the rural, okay, subtract out the background -- and, in fact, because of this equation, you don't even have to do that; the average will work out -- but let's just take out 90, and you get 127, right?
MR. GROSSMAN: Okay.
THE WITNESS: Then you do the urban, say, 160, take out the 90; you get 70, right?
MR. GROSSMAN: Right.
THE WITNESS: So you add those two together. You get 79, 197. Divide that two -- 98.5, I believe.
MR. GROSSMAN: Right.
THE WITNESS: Now let's add that to the background, and you get --
MR. GROSSMAN: One eighty-eight point five?
THE WITNESS: Yeah, 188.5, but these were based, I want to caution, these numbers were based on certain other assumptions which I don't agree with, assumptions that --

MR. GROSSMAN: Just for the record, we're talking about micrograms per cubic meter.
THE WITNESS: Absolutely --
MR. GROSSMAN: Okay.
THE WITNESS: -- micrograms per cubic meter. So this is just under the standard, but I'm going to talk about other methods or assumptions and tools that were used that would compound this.
MR. GROSSMAN: I understand. Also, just for the record, we're talking about the one-hour NO2 --
THE WITNESS: Yes. Yep.
MR. GROSSMAN: -- readings or measurements.
THE WITNESS: Right.
MR. GROSSMAN: Okay. Go ahead, sir.
MS. ROSENFELD: I don't know what time it is. Actually, this would be a good time to take a break for lunch, if that's okay with you.
MR. GROSSMAN: Sure.
MS. ROSENFELD: We're going to move into another subject that's going to take some time.
MR. GROSSMAN: Okay. I want to make sure Mr. Silverman gets his food because I don't want him to be grumpy at me.
MR. SILVERMAN: I saw the nice food in the cafeteria. I'm sure most of it's gone now.

MR. GROSSMAN: Probably. I'm not going on the record about that. How much more do you estimate Dr. Cole's testimony? How much longer?
MS. ROSENFELD: I would expect probably, easily between two and three hours.
MR. GROSSMAN: Okay. All right. So shall we -- it's about 13 minutes to 1:00 -- shall we come back at around 1:30?
MR. GOECKE: Sure.
MR. GROSSMAN: All right. So we'll break for lunch.
(Whereupon, at 12:46, a luncheon recess was taken.)
MR. GROSSMAN: Back on the record.
MS. ROSENFELD: Back on the record.
BY MS. ROSENFELD:
Q Dr. Cole, over the break were you able to prepare a graphic that would illustrate the effect of air moving from urban to rural or vice versa?
A I won't say it's the best graphic in the world, but I think it makes the point. So here's the situation --
MS. ROSENFELD: Mr. Grossman, can you see?
MR. GROSSMAN: I can.
MS. ROSENFELD: Okay.
MR. GROSSMAN: You can use my wanted pointer.

THE WITNESS: No, that's okay.
MR. GROSSMAN: Oh.
MR. SILVERMAN: Oh, no.
MR. GROSSMAN: This is called crestfallen.
THE WITNESS: You really want me to use it?
MR. GROSSMAN: No, it's okay. You use whatever you're comfortable with.
MS. ADELMAN: He's amortizing it.
MR. GROSSMAN: Yes. If you want to waste government's money on a physical thing when you have a laser pointer, go ahead. It won't be held against you.
THE WITNESS: But it's a battery. It's using battery, which is, has an environmental impact. So --
MS. ADELMAN: Oh, dear.
MR. GROSSMAN: Okay. I understand. You've justified it.
MR. SILVERMAN: You have to watch out.
THE WITNESS: So we're talking about transitions between urban, between rural or semi-rural or suburban rural, whatever you want to call it. This area has met the EPA's criteria for rural. Here, let's say, is the source and here's the rougher surface. These are supposed to be buildings. So my only point was that the transition zone doesn't happen all at once. It's not abrupt. It occurs from the bottom up because the, the change is on the bottom.

The rougher surface is on the bottom.
MR. GROSSMAN: Right.
THE WITNESS: So the turbulence is induced, but as the wind -- as the flow moves downwind from the source, the urban turbulence becomes more a problem and becomes more prominent --
MR. GROSSMAN: Yes.
THE WITNESS: -- and the depth of that layer, that urban layer, increases. But in this case, if the wind is from the south and here's the source -- and the wind is a lot from the south; according to, according to the reports by Mr. Sullivan, that's a quite frequent wind direction -- so then you have a transition zone where the depth of the rougher zone is not as deep as it would be hundreds of meters downwind. So my point is that you don't suddenly go from urban -- rural to urban.
MR. GROSSMAN: I understand.
THE WITNESS: Okay? It's this --
MR. GROSSMAN: It's gradual.
THE WITNESS: So in here, what do you use in here? If you were here, urban would be appropriate; if you were here, rural dispersion would be appropriate. It's quite complicated --
MR. GROSSMAN: Right.
THE WITNESS: -- in this other zone. Okay?

BY MS. ROSENFELD:
Q Dr. Cole, in calculating the average between the urban and the rural earlier -- actually, let me, could we go back to the slide from Mr. Sullivan's report that shows his urban calculations? This would be his 2013 report --
A Right.
Q -- which shows the urban calculations.
A That would be my Slide No. 8, which is hopefully --
MR. GROSSMAN: All right. We're on 404(a), Slide 8.
MS. ADELMAN: Good.
BY MS. ROSENFELD:
Q And you had averaged the urban and the rural --
A Uh-huh.
Q -- earlier and come up with a figure, I believe, of about 188.
A One eighty-eight point five.
Q Would you please calculate that average using the 168 that's shown on Mr. Sullivan's Figure 9 from his August 2013 report, please?
A Well, there, if you, if you use the 168 as the max in Figure 9 and you average that with the next slide, which is 217, there you get an average of, let me see, 192.5.
Q And is that above or below the one-hour EPA

standard for NO2?
A The standard is 190. So that would be above.
Q Okay, thank you.
MR. GROSSMAN: Where did the 160 come from, in the first place, that you used initially in that calculation?
THE WITNESS: Let's see. I have to go to the report. I have to go to Mr. Sullivan's report --
MR. GROSSMAN: Okay.
THE WITNESS: -- to answer that. Okay. That would be his Figure i, which is in the executive summary, where he has a 160. And, as I said, the --
MR. GROSSMAN: Which report? That's the November report?
THE WITNESS: No. This is the August.
MR. GROSSMAN: This is the August report?
THE WITNESS: Yes, the August report.
MR. GOECKE: 255(a) is the exhibit.
THE WITNESS: It's small Roman number i figure, Figure small Roman number i. It's on page 5 of Exhibit 255.
MR. GROSSMAN: So I can't recall if that difference was pointed out during Mr. Sullivan's testimony, where you're saying 168 on Slide, on your, well, you say it's from Sullivan's -- I don't have that report in front of me now. Well, I do have a copy here somewhere.
THE WITNESS: Well, this is, this is Slide No. --

Figure No. 9 in his August report has the 168 value.
MS. ROSENFELD: Which is on page 24 of the same August 16th report, Exhibit No. 255(a).
THE WITNESS: Yeah.
MR. GROSSMAN: Okay. And I'm sorry. What page is his --
THE WITNESS: 24.
MR. GROSSMAN: Pardon me?
THE WITNESS: They're both shown on, well --
MR. GROSSMAN: Where's the summary that you read from, that had the --
THE WITNESS: Okay. That was on page 5. The one with the 160 --
MR. GROSSMAN: Was on page 5?
THE WITNESS: -- is on page 5. It's Figure small Roman i or 1.
MR. GROSSMAN: Yes, 160.2.
THE WITNESS: Yes.
MR. GROSSMAN: Do we know what accounts for that difference?
THE WITNESS: I don't know what accounts for the difference.
MR. GROSSMAN: I see Mr. Sullivan is here. I'm going to break from your testimony for a second. Mr. Sullivan, you're still under oath. What accounts for

that difference?
MR. SULLIVAN: My recollection -- and I'd have to check to confirm -- is the 168 is based on the older background value of 98 micrograms and the 160 is based on, on the more updated background of 90. That's my recollection.
MR. GROSSMAN: Okay.
THE WITNESS: So there's a -- it appears then that there is a mistake on Figure 9, because it says the background, plus 90 micrograms per cubic meter background.
MR. SULLIVAN: Mr. Grossman --
MR. GROSSMAN: Yes.
MR. SULLIVAN: -- I believe on the record that came up during my testimony. I'm not a hundred percent sure, but I think it did. It should be in the transcript.
MR. GROSSMAN: Okay.
THE WITNESS: Okay. So this should be corrected then.
MR. GROSSMAN: Well, he's saying one is based on the newer, yes, it appears that that's -- but I just don't recall that particular issue.
THE WITNESS: Okay.
MR. GROSSMAN: So --
THE WITNESS: Let me make the point that if it's -- if the average of rural and urban, whether it's 188.5 or

192.5, the average of those two is at the standard, and there are many other reasons why I, and I'll demonstrate, that these values are likely to be underpredicted.
MR. GROSSMAN: Yes. You're saying, so whether it's 188.5 or 192.5 micrograms per cubic meter, it's still too close to the standard and from your standpoint there are other reasons why it understates the actual value?
THE WITNESS: Exactly.
MR. GROSSMAN: Okay.
THE WITNESS: Thank you.
BY MS. ROSENFELD:
Q Okay. Dr. Cole, the second major concern that you had regarding Mr. Sullivan's report involved his choice of MOBILE6 versus MOVES, and could you identify which pollutants are most implicated by that choice of modeling?
A Yes. One is PM2.5, and that factor, MOVES gives values for slow speeds and idling approximately 10 times higher than MOVES for that same class of speeds --
MS. ADELMAN: MOBILE6.
THE WITNESS: -- idling and slow speeds.
BY MS. ROSENFELD:
Q And --
A So we're talking about a tenfold difference from MOVES to MOBILE6, which is what Mr. Sullivan relied on.
Q And is there another pollutant that's also

particularly affected by the choice of --
A Yes. That would be NO2, nitrogen dioxide. The one-hour standard is a very critical element here, and in that case, MOVES underpredicts, by the evidence that I'll show, by a factor of two.
MR. GROSSMAN: MOVES underpredicts or MOBILE6 underpredicts?
MR. SILVERMAN: MOBILE6.
THE WITNESS: What did I say?
MR. GROSSMAN: You said MOVES.
THE WITNESS: Oh. MOVES gives you twice the emissions for NOx at slow speeds and idling, and I will show evidence, independent evidence for that. Also, it's -- those two differences between MOVES and MOBILE6 have been acknowledged by Mr. Sullivan.
MR. GROSSMAN: Yes. I recall that.
THE WITNESS: Okay.
BY MS. ROSENFELD:
Q And what does the acronym MOVES stand for, just for the record?
A MOVES is Motor Vehicle Emission Simulator.
Q And what does the acronym MOBILE6 stand for?
A Well, I believe -- I could not find what that acronym, what it stands for. I looked all over the place.
MR. GROSSMAN: Maybe it's not an acronym. It's

mobile; so maybe it's --
THE WITNESS: Mobile, I don't know. It's a moot question, though, because it's no longer an EPA recommended emissions model.
BY MS. ROSENFELD:
Q And do you know why EPA replaced MOBILE6 with MOVES?
A I would like to read into the record EPA's description, and this is from a report, which I've documented, called EPA Releases MOVES2010b Mobile Source Emissions Model Revision.
MR. GROSSMAN: Is that physically in the record?
MS. ROSENFELD: Yes, it is, Mr. Grossman. It is Exhibit No. 404(d), like dog. It's been --
MR. GROSSMAN: Okay.
MS. ROSENFELD: -- introduced into the record, and hard copies were provided 10 days in advance.
MR. GROSSMAN: Okay, 404(d). Let me take a look at it.
THE WITNESS: You asked why EPA replaced MOBILE6, is that --
MR. GROSSMAN: If we have it, you don't have to read it into the record if it's already in the record in hard copy, which it is.
THE WITNESS: Okay. Let me highlight the point --

MR. GROSSMAN: Okay.
THE WITNESS: -- is that MOBILE6 was based on a very limited amount of testing, whereas MOVES is based on an enormous amount of data and information and testing of automobiles. EPA says it was millions of emission test results and reflects the agency's considerable understanding of vehicle emissions since MOBILE6.
MR. GROSSMAN: Okay.
THE WITNESS: I want to make another point which is that if you're doing a regional analysis, it's one thing to have some problems; however -- and I would like to read this because it's so critical.
MR. GROSSMAN: What are you reading from?
THE WITNESS: I'm reading from Federal Register, and this is way back in March 10th, 2006, where they first were figuring out the problems with MOBILE6.
MR. GROSSMAN: All right. Well, hold on. Is that in the record?
MS. ROSENFELD: Yes, it is.
MS. ADELMAN: Page 13.
MR. GROSSMAN: I'm sorry?
MS. ADELMAN: Page 13, right?
MR. GROSSMAN: Page 13 of the slide, you mean? Slide 13?
MS. ROSENFELD: No.

MS. ADELMAN: No?
MS. ROSENFELD: No. We have introduced the Federal Register into the record -- several times, I believe. Mr. Grossman, I don't see it here right at the moment. I did think it was in the record. If not, I'll certainly supply it.
MR. GROSSMAN: Okay. Well, what's the point, Dr. Cole?
THE WITNESS: I would ask you to let me read one paragraph into the record, because it's critical to this particular case.
MR. GROSSMAN: All right. What's the citation for it first?
THE WITNESS: The citation is Federal Register, Volume 71, No. 47.
MR. GROSSMAN: Hold on. Volume 71.
THE WITNESS: Yeah.
MR. GROSSMAN: Federal Register, Volume 71. What's the rest of it?
THE WITNESS: Number 47.
MR. GROSSMAN: Number 47.
THE WITNESS: March 10th, 2006.
MR. GROSSMAN: Okay.
THE WITNESS: Pages 12498 to 12499.
MR. GROSSMAN: 12498 --

THE WITNESS: And here they're talking about --
MR. GROSSMAN: -- to 12499.
THE WITNESS: -- what needs to be incorporated, and they're talking about the difference between the new model, MOVES, and the problems with MOBILE6.
MR. GROSSMAN: Okay. Go ahead.
THE WITNESS: However, at the microscale level for hot-spot analyses, these limitations become very significant. Activity factors such as speed, driving cycle, and number and distribution of engine starts per day do have an important impact on actual PM2.5 or PM10 emissions for motor vehicles. Most, if not all, transportation projects that would need to be analyzed would result in changes in these activity levels that would need to be incorporated into credible hot-spot analyses. For example, and it gives some examples here, construction of a highway interchange, anything that -- it says anything that changes average speeds, driving cycles of vehicles, idling time, et cetera, in the immediate vicinity of the interchange.
So here they're talking about an interchange, but I want to focus on the term microscale because a lot of the EPA analyses are for, like, state-implementation plans or to comply with the overall air quality standards for a region, but here we're talking about specific impacts to ensure that at the microlevel, at the level of a particular facility

which has lots of motor vehicle emissions, that that area not go over the standard. It may be that the regional, regionally, using the monitors that are regional, the standard looks okay or the modeling shows that it's in compliance, but that's not necessarily true at these places where there's a lot of traffic --
MR. GROSSMAN: Yes.
THE WITNESS: -- and here we're adding more traffic to a place that has a lot of traffic. So it's important that you consider, to get an accurate input for emissions, for motor vehicles, that reflects EPA's current model, which is MOVES2010.
MR. GROSSMAN: Okay.
BY MS. ROSENFELD:
Q And --
A Yeah.
Q Oh, I'm sorry. Dr. Cole, you've stated that, in your view, the emissions levels for PM2.5 and NOx would be understated using the MOBILE6 --
A Yes.
Q -- modeling. Do you have some independent evidence or information that you can show to support that? And I'd start by referring you to Figure 6.
A Figure 6? Is that my --
MR. GROSSMAN: Figure 6 of what?

MS. ROSENFELD: Figure 6 of Exhibit 404(a).
MR. GROSSMAN: Okay.
THE WITNESS: Is that the slides?
MR. GROSSMAN: That's your slides, yes.
MS. ROSENFELD: Oh, wait, wait, wait. Wait.
MR. GROSSMAN: But hold on. Stand by.
BY MS. ROSENFELD:
Q Actually, stand by. I'm not sure that that is -- one moment. That's the wrong figure. Figure 14. Figure 14 --
MR. GROSSMAN: Figure 14 in his slides?
MS. ROSENFELD: Yes, I'm sorry.
MR. GROSSMAN: 404(a)?
MS. ROSENFELD: Figure 14 of 404(a).
THE WITNESS: Right.
MR. GROSSMAN: Okay.
THE WITNESS: 13 is just a summary of what I just said.
MS. ADELMAN: Yes.
MR. GROSSMAN: 14.
THE WITNESS: 14 --
BY MS. ROSENFELD:
Q 14, yes.
A -- 14 is from a Federal Highway Administration 2010 study.

MR. GOECKE: I'm sorry. What page is that on?
MS. ADELMAN: 14.
MS. ROSENFELD: 14.
THE WITNESS: 14.
MR. GROSSMAN: No. It's -- if it's Figure 14, it's not on page 14.
MS. ROSENFELD: No, it's, I'm sorry, it is --
THE WITNESS: Figure 14.
MS. ROSENFELD: -- Figure --
MR. GROSSMAN: Figure 14, which is on page?
MS. ROSENFELD: No. It is page 14.
MR. GROSSMAN: No. Well, page 14 is Figure 10 of his slides.
MR. GOECKE: That's what mine says too.
MS. ROSENFELD: Okay.
MS. ADELMAN: Mine doesn't have a figure.
MS. ROSENFELD: Mine doesn't have a figure.
MS. ADELMAN: Mine doesn't have a figure either.
MR. GROSSMAN: I don't want to say anything about my figure. Well, do you want to look at the exhibit that's in the record?
MR. GOECKE: Are you still on 404(a)?
MS. ROSENFELD: I'm still on 404(a). Let me just --
MR. GROSSMAN: Don't trip on the wires. My page

14 has Figure 10 on it.
THE WITNESS: Oh, wow.
MS. ROSENFELD: May I see what you're --
MR. GROSSMAN: Yes.
MR. GOECKE: So does mine.
MS. ADELMAN: Oops. Careful, Michele.
MR. GROSSMAN: Careful, Michele.
MS. ROSENFELD: Actually, can you --
MR. GROSSMAN: Okay. There you go.
MS. ROSENFELD: Okay.
THE WITNESS: Are we missing something? Is this the copy of the slides?
MR. GROSSMAN: Yes. That's what we have, Exhibit 404(a).
THE WITNESS: Here it says 11. What I'm referring to perhaps on your chart --
MR. GROSSMAN: Yes.
THE WITNESS: -- is Figure -- is page 11 here.
MR. GROSSMAN: Okay.
THE WITNESS: Here it is.
MR. GROSSMAN: Okay. All right. So, yes, it doesn't have figure number, but it is page 11 in Exhibit 404(a).
THE WITNESS: Yeah. So they ran, they did a sensitivity analysis, comparing what you would get from

various formulations, in particular, MOVES versus MOBILE6. And just to eliminate some possible confusion here, the, there are different kinds of traffic links that EPA considers in these kinds of analyses, and the best one to use is urban unrestricted, which is the blue-dashed line. Some of this is a little bit difficult to see perhaps, but what this shows is that as the speed goes down, MOVES predicts higher and higher emissions, and it's an exponential increase as the speed goes down. So that this is at about two, 2.5 miles per hour or so, and you see that MOBILE6 gives a value of about point, looks like it's about, between .1 and .2, whereas MOVES gives a value of about 12. So --
MR. GROSSMAN: Well, these are actually factor differences. It's a factor --
THE WITNESS: Well, these are --
MR. GROSSMAN: -- so there's a 12 percent --
THE WITNESS: No, no, no, no, no. No.
MR. GROSSMAN: Am I misreading that? That's what it says on here: Fleet Average Emission Factor. So I --
THE WITNESS: Yeah. So --
MR. GROSSMAN: -- assume that what that means in the vertical column is that MOVES, at the slower speed, let's say of 2.5, is giving -- is a factor of 15 percent, .15 or close to it.

THE WITNESS: No. Let me explain.
MR. GROSSMAN: Am I misunderstanding that?
THE WITNESS: The print is so small, I can see why you'd --
MR. GROSSMAN: Well, it wasn't the small print. It's what it says on the vertical column.
THE WITNESS: Well, it says, but look at -- the units state, grams per vehicle mile traveled --
MR. GROSSMAN: Right.
THE WITNESS: -- which is an input that's used to get the emissions that are input then to the dispersion model, okay? So that the difference is -- these are not percentages.
MR. GROSSMAN: I see.
THE WITNESS: These are units.
MR. GROSSMAN: All right.
THE WITNESS: So the difference between, let's say, 1.2 and 12 is a factor, whoops, a factor of 10 --
MR. GROSSMAN: Okay.
THE WITNESS: -- and this is, I would just add that Mr. Sullivan has acknowledged that difference at low speeds and idling for --
MR. GROSSMAN: Right. I see what you mean now --
THE WITNESS: Yeah.
MR. GROSSMAN: -- and this is the PM2.5

measurement --
THE WITNESS: This is PM2.5.
MR. GROSSMAN: -- and --
THE WITNESS: Yes.
MR. GROSSMAN: -- and yes, I see, I see what you're saying. That's actually not a -- even though it says factor, I thought they meant it in terms of a percentage --
THE WITNESS: Right.
MR. GROSSMAN: -- factor, but they meant it in terms of this is a factor --
THE WITNESS: Yeah. Yeah.
MR. GROSSMAN: -- and --
THE WITNESS: Yeah.
MR. GROSSMAN: -- and, yes, it looks like it's, it is considerably higher at the slow speeds. It's a virtually zero difference at 60 miles an hour, but it's --
THE WITNESS: Right.
MR. GROSSMAN: -- and apparently MOBILE6 is a flat line for --
THE WITNESS: Yeah.
MR. GROSSMAN: -- at any speed.
THE WITNESS: That's right. The problem with MOBILE6 for PM2.5, it's not true for all of the pollutants, but for PM2.5 it is a flat --
MR. GROSSMAN: Right.

THE WITNESS: -- line, meaning that it's totally insensitive --
MR. GROSSMAN: Right.
THE WITNESS: -- to driving speed.
MR. GROSSMAN: I don't think we have to spend any more time on that. I think it's been --
THE WITNESS: Yeah.
MR. GROSSMAN: -- conceded by Mr. Sullivan and there's no evidence to dispute that MOVES will show a 10 times higher level of PM2.5 --
THE WITNESS: Okay.
MR. GROSSMAN: -- at those speeds. So I don't think it's a disputed issue.
THE WITNESS: Okay.
BY MS. ROSENFELD:
Q Dr. Cole, just one point of clarification on that graph. Underneath it, it has -- it says, MOVES Urban Restricted, MOVES Rural Restricted. Do those terms urban and rural in this graph have any correlation to the urban slash rural dichotomy that we've been discussing for dispersion?
A Not at all.
Q Okay. Can you explain --
A These are based -- here we're dealing with emissions and emission sources, like a link on a highway --

MR. GROSSMAN: Right.
THE WITNESS: -- is there a ramp or not? Are we dealing with rural conditions, meaning far fewer traffic, less restriction perhaps? For example, arterial would be, for the MOBILE, would be for roadways. Urban restricted would be, for example, a ramp going up to, let's say, an elevated freeway or something.
MR. GROSSMAN: Okay.
THE WITNESS: So the unrestricted is what EPA -- urban unrestricted is what they would apply to streets and intersections and places where there are a lot of motor vehicles but that are not restricted by a ramp.
MR. GROSSMAN: Yes. I think the distinctions between those lines is very small --
THE WITNESS: Yeah.
MR. GROSSMAN: -- and not material to the kind of analysis we're doing here.
THE WITNESS: Right.
MS. ROSENFELD: I understand. I just wanted to make sure that later in looking at this there wasn't confusion about --
MR. GROSSMAN: We didn't get confused.
THE WITNESS: Right. This is --
MR. GROSSMAN: I'm glad you cleared it because I, I did assume --

MS. ROSENFELD: -- because we've been using those terms so often.
THE WITNESS: No, this has nothing to do with dispersion.
MR. GROSSMAN: Okay.
THE WITNESS: It has everything to do with emissions.
MR. GROSSMAN: Okay.
THE WITNESS: Okay.
BY MS. ROSENFELD:
Q And, in your opinion, which of these roadway characterizations most accurately reflects the driving conditions that occur on the surrounding network, roadway network?
A That would be urban unrestricted, according to EPA guidance.
Q Dr. Cole, if you could turn to page 15, Slide 15.
A Is that the right one?
Q That is the right one --
A Okay.
Q -- only I'm not sure if it's the right one in --
MR. GOECKE: That's different than mine.
MR. GROSSMAN: Slide 15?
MS. ADELMAN: What's yours look like, Mike?
THE WITNESS: It's probably 16 on -- maybe it's 16

on yours.
MS. ROSENFELD: Mr. Grossman, I apologize. I'm not quite sure why these numbers are not correlating. I have a black-and-white copy that appears to correlate with the slides, slide numbers that Dr. Cole has. Could we take a three-minute break, let me run some extra copies, introduce this into the record?
MR. GROSSMAN: Sure, or you could -- I'm not sure what accounted for the page differences, but they --
MS. ROSENFELD: I'm not sure either, and I will submit a full color copy and account for that. I'm not quite sure why --
MR. GROSSMAN: Whatever --
MS. ROSENFELD: -- but I think so far everything that we've talked about the other side has had a copy of.
MR. GROSSMAN: You're not casting aspersions on those rural dispersions, are you?
MS. ROSENFELD: No. Whichever is --
MR. GROSSMAN: I don't feel it's a successful day unless I've been hissed at least once. So --
MS. ROSENFELD: Whichever way you think is better for the record, and I do apologize. We --
MR. GROSSMAN: Whatever you want.
MS. ROSENFELD: Okay.
MR. GROSSMAN: If you want to take the break,

we'll take the break. If not, we'll go forward.
MR. GOECKE: I don't think we have a copy of this slide. So if we're looking at a different exhibit than what we've been provided, I would like a copy of the actual exhibit.
MS. ROSENFELD: Okay. Let's do that. So we'll put --
MR. GROSSMAN: All right. Or you want to just take --
THE WITNESS: I would point out that there's a --
MR. GROSSMAN: -- do you want to take a break? Is that what you want to do?
MS. ROSENFELD: I'll just run down the hall and make some copies.
MR. GROSSMAN: Okay.
THE WITNESS: That is from Table 1-6 of the August 16th report by Mr. Sullivan.
MR. GOECKE: Okay.
MR. GROSSMAN: Why don't you just stick your head in the door of my office when you're ready, and --
MS. ROSENFELD: Okay.
MR. GROSSMAN: -- I'll come out.
MS. ROSENFELD: Okay.
MR. GROSSMAN: We'll recess momentarily.
(Whereupon, a brief recess was taken.)

MR. GROSSMAN: So are we raring to go?
MS. ROSENFELD: We are, Mr. Grossman, and I do apologize. We -- there are several additional slides in the documents that Dr. Cole and I have been looking at.
MR. GROSSMAN: I see.
MS. ROSENFELD: What I'd like to do is submit this. Maybe we can mark it --
MR. GROSSMAN: Okay.
MS. ROSENFELD: -- 404(a)(1), and --
MR. GROSSMAN: Since it's a whole new set --
MS. ROSENFELD: It's --
MR. GROSSMAN: -- why don't we just make it a new exhibit number.
MS. ROSENFELD: Okay.
MR. GROSSMAN: 406, and we'll say revised Dr. Cole slide show.
(Exhibit No. 406 was marked for identification.)
MS. ROSENFELD: Yes.
MR. GROSSMAN: Okay.
MS. ROSENFELD: Okay.
MR. GOECKE: And I'm sorry. You called it revised 404(a) --
MR. GROSSMAN: Revised Dr. Cole slide show. We could say Dr. Cole slide show, Exhibit 404(a), just to be

clear what we're talking about.
MR. GOECKE: Thank you.
MS. ROSENFELD: Okay.
MR. GROSSMAN: And so you have a copy for --
MS. ROSENFELD: For you? Yes, I -- of course I do.
MR. GROSSMAN: Thank you. I was feeling left out.
MS. ROSENFELD: I apologize. Do you want to go up and do the honors?
MR. GROSSMAN: Thank you, sir. Mr. Goecke, are there any slides in the new exhibit, 406, that create a problem with proceeding now with these extra slides with Dr. Cole?
MR. GOECKE: That's a good question. Ms. Rosenfeld and I went through them, and apparently there are nine pages here that were not in the original 404(a).
MR. GROSSMAN: Okay.
MR. GOECKE: I haven't studied each of them yet, but I think -- I think some of them are from Mr. Sullivan's report, but then others, I think, are new.
MR. SULLIVAN: Page 18 looks new.
MR. GOECKE: Page 18 does look new.
MR. SULLIVAN: Michele, it would certainly help us to say which pages are new that aren't from one of my reports.

MR. GROSSMAN: Do we know that, Ms. Rosenfeld?
MS. ROSENFELD: Okay. I'm going to start from the beginning. Page 1 comes from Mr. Sullivan's report. Pages 2 and 3 had been provided and have already been testified to. Page 4 is simply a recitation of the AERMOD acronym. Page 5 I think is just a summary of something that Dr. Cole had already testified to. He didn't reference the slide in his testimony. I believe this is new. Is that --
MR. GOECKE: It's not new --
MS. ROSENFELD: Oh, Slide 5 is not new.
MR. GOECKE: -- and I don't think he testified about it.
MS. ROSENFELD: Slide 6 comes from Mr. Sullivan's November 2012 report, as does Slide 7. Slide 8 comes from his August 13th report. Slide 9 comes from, and 10, both come from his August '13 report. Slide 11 comes from his November 2012 report. Page 12 is a quote and, I believe, comes from Exhibit 404(d).
BY MS. ROSENFELD:
Q Dr. Cole, do you know if that -- do you remember? Slide 12.
A Which slide? Which?
Q Slide 12. I believe that comes from Exhibit 404(d), which had been provided in full.
A Right.

MR. GROSSMAN: Well, it's not a controversial thing anyway. So it's not --
MR. GOECKE: Right.
MS. ROSENFELD: And same for Slide 13. Slide 14 had been provided.
MR. GOECKE: Yes.
MS. ROSENFELD: Slide 15 comes from Mr. Sullivan's August 16th report, as does Slides, do Slides 16 and 17.
MR. GOECKE: I think 18 is new.
MS. ROSENFELD: I think Slide 18 is new.
MS. ADELMAN: What's it called?
MS. ROSENFELD: Estimating Maximum One-Hour NO2 Concentrations, but it's a formula that I expect Dr. Cole will testify to.
MR. GOECKE: Yes, we have no objection to him testifying about --
MR. GROSSMAN: Okay.
MR. GOECKE: -- page 18 right now.
MS. ROSENFELD: Okay. 19 comes from the August 2013 report; so does page 20. Slide 21, was that in your --
MR. GOECKE: We had that one before.
MS. ROSENFELD: Okay. And 22?
MR. GOECKE: I think it's new.
MS. ROSENFELD: Okay.
MR. GOECKE: I think 21 might be new as well. It

looks familiar, but I don't see it in the original -- oh, here it is. It's --
MS. ADELMAN: Have it in color, yes.
MR. GOECKE: Yes, we had the first one. We had 21 but not 22.
MR. GROSSMAN: It looks like 22 just is missing graphs --
MR. GOECKE: Yes.
MR. GROSSMAN: -- and a line that -- and has added a line --
MR. GOECKE: Yes.
MR. GROSSMAN: -- that says MOBILE6, rather than MOVES, additional negative error, but in any event -- all right. So 23?
MS. ROSENFELD: 23 is an excerpt. It's a quote from an exhibit that was provided, Exhibit No. 404(b). It's an excerpt from a document that's in the record at 404(b).
MR. GROSSMAN: Okay.
MS. ROSENFELD: And 24 as well and 25 as well, as 26.
MR. GOECKE: These are all from 404(b)?
MR. SILVERMAN: Yes.
MS. ROSENFELD: These are from 404(b). 27, I believe -- I believe 27, 28, and 29 are all new. Do you have 27 and 28?

THE WITNESS: Excuse me. I have a --
MR. GROSSMAN: Yes, sir.
THE WITNESS: Slide No. 25, at least on my screen, which shows this, is from the Michael Claggett report, not the congestion, traffic congestion report.
MS. ROSENFELD: Okay.
THE WITNESS: So please distinguish between those two exhibits.
MR. GROSSMAN: Okay.
MS. ROSENFELD: And the Claggett report would be 404(c).
MR. GROSSMAN: All right. So we're up to --
MS. ROSENFELD: 27 and 28.
MR. GROSSMAN: 27, on one of your errors.
MR. GOECKE: We had those two already.
MR. GROSSMAN: Okay. 29?
MR. GOECKE: We do not have this.
MS. ROSENFELD: 29 is new, and 30 came from a submission that Dr. Cole --
MR. GROSSMAN: Yes, I've seen this little chart before.
MS. ROSENFELD: -- it's in the record already.
MR. GROSSMAN: Right. Okay.
MR. GOECKE: We have no objection to that.
MR. GROSSMAN: Okay.

MS. ROSENFELD: Okay. Thank you. And I do apologize.
MR. GROSSMAN: All right. You may proceed. Oh, if we didn't have a few mix-ups with this amount of paper, it would be a miracle. So don't sweat it.
THE WITNESS: Slide 29 was included in an earlier submittal --
MR. GROSSMAN: Okay.
THE WITNESS: -- as was Slide, the next one.
MR. GROSSMAN: 30. Yes, I've already seen 30. We know that. I hadn't, I didn't remember --
THE WITNESS: I think it was in the report that I submitted to you, either you or the --
MR. GROSSMAN: You mean this one?
THE WITNESS: Yes.
MR. GROSSMAN: Yes. I have seen this one. I just didn't --
THE WITNESS: Okay.
MR. GROSSMAN: -- I don't recall the one on Slide 29.
THE WITNESS: This one is, this one --
MR. GROSSMAN: Oh, you have it as 29. In ours -- yes, 29. I didn't recall 29. I recalled 30, but it may, I'm not saying that -- I haven't memorized all of this stuff, decided to maintain my sanity instead.

BY MS. ROSENFELD:
Q Okay. Dr. Cole, if we could go back to Slide 15.
A Okay.
Q Could you explain where this, where this slide came from?
A This is from Mr. Sullivan's August 16th report, and my only reason for including it was to show that for PM2.5, it doesn't matter what speed they're using, that the emission rate is the same. It's not so for the other pollutants, but for particulates where there's this tenfold difference, they don't -- this is showing they don't account for it.
Q And so, in your opinion, what is the modeling result with respect to the PM2.5 idling sources?
A Well, they would be underestimated by a factor of 10.
Q Shifting now to NOx emissions, without going through the same, same chart analysis, I think the testimony uniformly has been that MOVES understates NOx by --
A All right. I meant to have a slide with NOx. The curves look very similar as to the PM2.5, but the differences are not as great.
MR. GROSSMAN: By a factor of two instead of a factor of --
THE WITNESS: Yes. So that's my only point there.

This turns out --
MR. GROSSMAN: Do you have anything to say about -- Mr. Sullivan distinguished NOx from NO2 and NO in terms of how far away you were from the source of emission and how fast it, what the impacts were on the analysis based on that, that only 25 percent, if I recall, of NOx is NO2. I forget the exact figures, but do you have --
MR. SILVERMAN: It's the opposite.
MR. GROSSMAN: No, only 25 percent of NOx is NO2.
MR. SILVERMAN: I thought it was the -- well, I thought it was the other way around. He's the expert.
MR. GROSSMAN: NOx is the all-inclusive category, if I understand it; NO2 is a subpart of it, but I may have the amounts slightly incorrect. But in any event, do you have -- how does that factor into your analysis?
THE WITNESS: Okay. There's no one percent fits-all situations. So the assumption that Mr. Sullivan made was that a hundred percent of the NOx emitted from these many vehicles would be converted to NO2.
MR. GROSSMAN: Right.
THE WITNESS: I agree with that --
MR. GROSSMAN: Well, that was his most conservative assumption. He changed that for purposes of analysis near the Costco loading docks.
THE WITNESS: Are you referring to a, something

that's in one of his reports or something that he --
MR. GROSSMAN: Yes.
THE WITNESS: -- testified to?
MR. GROSSMAN: No, I think it's in his August report, as far as --
THE WITNESS: Can you show me what you're referring to?
MR. GROSSMAN: All right. My recollection is that he said that when you're at -- so close to a point source, it wasn't appropriate to consider it all as NO2, or whether he testified to that, I can't recall, but let me see if that's in the record. Here it is.
Actually, Mr. Sullivan, you could refresh my recollection on that. Was your distinction between NO2 and NOx mentioned in your August report, or was that something just that you testified about?
MR. SULLIVAN: No, it was mentioned in the August 16th, 2013, report.
MR. GROSSMAN: Okay.
THE WITNESS: I would state, if I may --
MR. GROSSMAN: Yes, sir.
THE WITNESS: -- it may be mentioned, but in the modeling results he's assumed a hundred percent. The modeling results that we see in tables and in graphs, I mean, in isopleth diagrams are based on a hundred percent.

MR. GROSSMAN: I think it's, well, my page number, I think, was slightly different, but Section 4.1.1 in his August 16, 2013, report deals with -- and 4.1.2 -- deals with assumed NOx one-hour emission rate for warehouse HDVD in November 2012 report. Then he talks about 2.5 is a scale-up factor to covert g/mile at idle to grams per hour, which is conservatively stated for NO2 emissions. Let's see. Mr. Sullivan, do you remember where it is in your --
MR. SULLIVAN: I'm looking for it now, Mr. Grossman. I remember -- I ran the model several different ways. In one of them, I did show the effect of more accurately considering the fact that the, there's not sufficient time for conversion where that maximum is occurring.
MR. GROSSMAN: Right.
MR. SULLIVAN: I just got to find the page.
MR. GROSSMAN: All right. Well, we'll come back to that when Mr. Sullivan finds the page. So you can go on with your questions, Ms. Rosenfeld.
BY MS. ROSENFELD:
Q In his testimony of September 20, 2013, Mr. Sullivan acknowledged that MOVES would be higher than MOBILE6 by a factor of two. He also stated that he did not use a correction factor for NOx emissions. If you were

modeling, what would you do to correct for the understated NOx?
A Well, I think the best solution is to use EPA's recommended model, which is MOVES2010, to get the most accurate information for the results of your emissions estimates. A second choice would be to multiply the emissions by a factor of two, which is something that's in the evidence I submitted and the Claggett report. At low vehicle speeds and idling, there's -- MOVES gives you a factor of two higher than does MOBILE, okay? So if you don't want to go and use MOVES -- and Mr. Sullivan has acknowledged that he could multiply by a factor of two, but he's also testified, I believe, on September 20th that he did not do that.
Q If you were to turn to Figure I, which is Slide 16 of Mr. Sullivan's, of your PowerPoint -- Figure I comes from Mr. Sullivan's 2013, August 2013 report -- I believe he's testified that we could put a factor of two in here and it would make a very small difference. And do you agree with his assertion on that point with respect to NO2, NOx?
A Not at all.
Q And can you explain why?
A Well, I did a little analysis. Your question was about the incremental impact?
Q The incremental impact of NOx, yes.

A Okay. I think one of the ways to see this is to look at two different figures from the August 2013 report. The first figure is based on the November 2012 modeling. It shows very high concentrations of NO2, one-hour NO2. I think it was well over 300, perhaps 388 or some very large figure. Now, then what Mr. Sullivan did in the 2013 -- and, by the way, this is with the error of background corrected. So this --
Q This being?
A -- appeared in the August report, but it was based on the modeling that was done in November but --
MR. GROSSMAN: With the mathematical error corrected.
THE WITNESS: Yes.
MR. GROSSMAN: Right, I understand.
THE WITNESS: Right. So --
BY MS. ROSENFELD:
Q And when you say this, Dr. Cole, what are you talking about? Are you talking about the blowup of Figure 1 --
A Yeah. The --
Q -- on Slide 20?
A On the left-hand side, you see -- and both of these are rural, and the reason I'm using rural here is because it allowed me to do a comparison, because we didn't

get, we didn't get the November 2012 results in the mall area for urban coefficients. Though we requested it, we did not get those values, as far as I know. So I compared rural and rural.

Now, what are we looking at here? The figure on the right is based on a revision in the emissions for the loading dock, okay? If you look at his page 18, Mr. Sullivan has reduced the emissions of the loading dock based on a number of assumptions. Fewer, fewer trucks idling for lesser times I believe is one of the key changes that he made. So it turned out that it was a 93 percent reduction in emissions from the loading dock.

Now, without making any judgment on that, this gives us an opportunity to see what happens when you remove the impact of the loading dock. So here Mr. Sullivan has shown what looks like a plume coming from the loading dock --

MR. GROSSMAN: Yes.

BY MS. ROSENFELD:

Q And could you use the pointer and --

MS. ADELMAN: Yes.

BY MS. ROSENFELD:

Q -- show where you're talking about?

A Oh, sure. I'm thinking that you can see my hand, but you can't. Okay. So the loading dock is here. We

see --

Q And you're looking at --

A -- very high values, but we also see a secondary area above 200 right in the area of the gas station.

Q And you're, again, looking at the blowup of Figure 1 on Slide 20?

A Yes. When we look at -- let's say for all practical purposes you've removed most of the effect. In this, because you've reduced the loading dock emissions by 93 percent, you now are able to see -- without the effect of the loading dock, you're able to see what's happening in the area of the gas station, okay? And you see that the values are well over 200. I think -- forget what the maximum was there, but there's an area over 200, an area that exceeds the standard in this particular result. That's with, without 93 percent of the loading dock emissions.

So Mr. Sullivan, I believe, testified, saying that he thought that the problem in the mall was a loading dock problem and not a gas station problem. Well, here he has eliminated basically, or at least 93 percent of the loading dock, and we still see values above the standard in this particular analysis. And I would have to say that I don't know what other explanation you can give but to assume that --

MR. GROSSMAN: I don't see a pointer because I

don't think you're pressing any button.

THE WITNESS: Oh, right.

MR. GROSSMAN: Okay.

THE WITNESS: Okay. So what explains the high values in the, in this area? And I --

MR. GROSSMAN: This area being the area right around where the gas station is.

THE WITNESS: Around the gas station and its surrounding, okay?

MR. GROSSMAN: Right.

THE WITNESS: So there's a principle in science called Occam's razor, which is that sometimes the simplest explanation is the best unless you have some other demonstration. Now, we have asked Mr. Sullivan to provide his analysis of the incremental effect of the gas station on concentrations in the mall, and we received a memo just yesterday, I believe it was, or the day before, stating that they hadn't done that work. And I find that a serious issue because he has in fact testified that the gas station would have, and its traffic, a minuscule effect on NO2 concentrations and, frankly, the evidence is very much to the contrary.

BY MS. ROSENFELD:

Q And, Dr. Cole, as with -- you've noted earlier, Mr. Sullivan stated in his November 20, 2012, report that in

his professional judgment, the most accurate modeling case for this site would use an intermediate value between urban and rural. Using the numbers from his 2013 report, his corrected and updated numbers, can you make a determination as to what NO2 concentrations would be -- NOx concentrations would be within the mall parcel?

A Okay. I think this is -- you're referring to Slide 18, I believe. Okay. So it starts out saying just what you said, with the intermediate, coupled with a factor of two to adjust it, if we're going to use what I believe are the most accurate, reasonable assumptions which agree with statements that Mr. Sullivan has used, the urban background being -- I mean, the background is 90; the urban is 160. So that gives you 70. We get, I don't know, we get a number of 98.5, let's say, but then to adjust for the correction to MOVES, from MOBILE6 to MOVES, which Mr. Sullivan has acknowledged to be a factor of two in that area where you have queues and slow-moving traffic, there you adjust by a factor of two and you get the value of -- 98.5 times two is 197. If you add 197 to 90, you get a value of 287 micrograms per cubic meter compared to the standard of 190. Let's say that you used a lower correction factor for MOBILE to MOVES based on somewhat faster speeds and you used 1.5 instead of, instead of two -- do I have the rest of that? Let me see what the rest of that -- so

there --
MR. GROSSMAN: What location is this?
THE WITNESS: This is the -- what we're doing is looking at max, the maximum location, which would be, as I've said, as shown --
MR. GROSSMAN: Okay.
THE WITNESS: -- would be right in the gas station --
MR. GROSSMAN: Right on the gas station area.
THE WITNESS: -- and it extends, but remember, this is based on certain refinements and has no correction factor for going from MOBILE6 to MOVES2010, okay?
MR. GROSSMAN: Okay.
THE WITNESS: So here, what I did here was I took this average and, based on the rural versus the modeled portion, averaging between rural and MOBILE, came up with 98.5 and then, to adjust from MOBILE to MOVES, multiplied that by a factor of two and got 197 and then added that to background, and you get 287, which is much higher, of course, than the standard, which is 190. But let's say that one were to argue that, okay, maybe there's some cars that are traveling slightly faster and maybe the correction factor overall for that area of the max is 1.5 rather than two. So you multiply the 70 by 105, you add the background of 90, and you get 195.

So my conclusion here is that if you correct for these, what I would call, not following EPA guidance on the MOVES and MOBILE and, also, not correcting for what Mr. Sullivan acknowledged to be the difference between MOBILE and MOVES and not considering an intermediate value for dispersion coefficients, which Mr. Sullivan has testified is, in his opinion, the most accurate, you still come up, even with the 1.5, you come up with 195 micrograms per cubic meter, which is above the standard.
MR. GROSSMAN: Let me ask you this, just being devil's advocate here for a second: If you were to -- let's say Mr. Sullivan were to say in response to this, well, if you're going to choose, if you're going to look at a point source such as this, you can't use the full NOx amount, you have to assume some reduction for the percentage, which is NO2 rather than NOx. If he is correct and if I recall his testimony correctly, that would knock off the difference between MOVES and MOBILE6 and then some; in other words, the distinction you've made would be eliminated and more so. I don't know if he, that's his answer, but --
THE WITNESS: Well, we need to, I would have to -- I'm not going to agree or disagree because I haven't done the calculation --
MR. GROSSMAN: Right.
THE WITNESS: -- but, okay, here's the issue:

What percentage do we use? Is it 25 percent? Is it 50 percent? Is it 75 percent? And the answer depends on many different variables.
MR. GROSSMAN: Well, he testified regarding that. I just haven't looked --
THE WITNESS: No. Well --
MR. GROSSMAN: -- in the last week or two.
THE WITNESS: -- excuse me, but, I'm sorry, but --
MR. GROSSMAN: Yes.
THE WITNESS: -- I have to say --
MR. GROSSMAN: Yes.
THE WITNESS: -- that in order to come up with an accurate answer would require some kind of chemical analysis and modeling of something that incorporates both dispersion and the chemical conversion. You would also have to include in that analysis what else was in the air. For example, if there's high levels of ozone in the air, in other words, the air quality is already bad, that conversion from NO to NO2 is a very fast reaction, on the matter of seconds -- not hours, seconds.
MR. GROSSMAN: Okay.
THE WITNESS: My -- from a scientific standpoint, if he wants to come in with a lower percent, he needs to do that kind of analysis. You don't just pick a number out of the air, like 25 percent or 50 percent. You would have to

go back and do a whole analysis of comparing ozone concentrations with NO concentrations and whatnot, because if the ozone is high, it's the ozone that makes that reaction go very, very fast, and other photochemical oxidants do as well. He has not done that analysis, and I would not accept the contention. In the absence of such an analysis, the conservative -- and I'll come back to this over and over again -- where there are uncertainties you go to the conservative position. He's used that in his results. He may have done a little correction or another modeling; I'm not aware of it. He's used that. I think that is the appropriate, 100 percent conversion in the absence of a much more complete analysis, which has not been done.
MR. GROSSMAN: Okay.
BY MS. ROSENFELD:
Q And, Dr. Cole, I just want to be clear, the formula that you worked through on Slide No. 18, those numbers came from Mr. Sullivan's August 2013 report --
A Yes.
Q -- is that correct?
A Right.
Q And so the 160 background for urban that you picked came from Figure i on page 5 of his report?
A No, the 160 maximum.

Q Maximum.
A Right. It could have been -- another, as I said before, another figure showed 168 and that was with the, according to Mr. Sullivan, that was with a background of 98 as opposed to 90.
Q But you used his lowest number?
A I used his lowest number.
Q And the rural number there of 217 came from Figure 10 on page 24 of his report, August 2013, is that correct?
A Yes.
Q So on, just to summarize, on the issue of MOVES versus MOBILE6, in your professional opinion, does the August 2013 report accurately predict the level of vehicular emissions for PM2.5 and NOx?
A For motor vehicle emissions, the answer would be no for both pollutants, PM2.5 and NO2.
Q I believe Mr. Sullivan testified that the NOx problem in the mall was really a loading dock problem, and in your earlier analysis where you backed out the loading dock and you looked at the comparison, does that demonstrate whether or not there's a loading dock problem?
A I didn't back out anything. It was Mr. Sullivan who backed down on his emissions from the loading dock. Without agreeing or disagreeing with his revision, it gives a snapshot of what concentrations and concentration patterns

are without the interference from the loading dock, because in this analysis the loading dock emissions from the high density, high -- heavy vehicle diesels have been reduced by a factor of 93 percent, and you can see that on page 18 of this report. The original was, emissions were .098. The, his refined, he calls it refined, went down to .007. So if you take the difference and divide by 97, you get a 93 percent reduction or a .93 fraction reduction.
Q Thank you. I'd like you to turn to Slide 19, and once we turn there --
A Okay.
Q -- I'm going to ask you a question.
A Yeah.
Q It's going to start with a fairly long quote.
MR. GROSSMAN: You're preparing me?
MS. ROSENFELD: I'm preparing you.
BY MS. ROSENFELD:
Q Okay. On September 20th Mr. Sullivan testified that the gas concentration -- that the gas station would only add .024 ug to the m3 to the overall NO2 concentrations and that's on page 46 of that transcript. And I'll --
MR. GROSSMAN: That was actually not a u. It's a mu.
BY MS. ROSENFELD:
Q A mu, and I will read his testimony. He says:

What I'm trying to get at is, in terms of NO2 and the ambient air around the mall site based on your modeling, what portion of the NO2 would come from the proposed Costco gas station as opposed to what's coming from other sources?
And the answer was: Thank you. I'm sorry. It's actually -- we did assess that -- it's actually .024 micrograms of that 277, or whatever you want to have, is from the gas station, including the gas station queue, the exits and entrances.
The question was: And that's .024 micrograms per cubic meter?
Answer: Right, which works out to be .008 percent. I mean, it's a warehouse issue, not a gas station issue. That particular bull's-eye that we're talking about there essentially has nothing to do with the gas station.
And do you agree with that assertion?
MR. GROSSMAN: And what page was that that you quoted from again?
MS. ROSENFELD: It was page 46 of the September 20th transcript.
THE WITNESS: No, I don't. I testified previously that when you eliminated 93 percent of the loading dock, you still had very substantial values. Where were those substantial values? Right in the area of the gas station and adjacent to the gas station.

So it's true that in this particular table, if I can refer to it, he shows some fairly low increments at the school, .24, I don't know if that's the same figure -- we're only looking here at the one-hour to the left -- and if you use the urban, let's use the urban for a minute, his impact was 5.3 from the gas station only, okay? So that's higher than the value that you're giving.
But the essential point that I want to make is, if you go back and you look at the dispersion pattern, you'll see that whatever's happening at the margin at the nearest home, which is, I believe, somewhere in here if I'm not mistaken, those values are going to be much -- incremental values from a ground-level area source are going to be much lower 125 feet away than they are at 20 feet away. There's no way around that. I mean, I showed you that in original slide. The concentrations decrease rapidly downwind of the source. So you cannot, I can't figure out any way that a level of five at the nearest home would be greater than a level right next to the gas station. That defies all modeling logic; in fact, I believe it defies the law of conservation of mass. It doesn't work that way.
BY MS. ROSENFELD:
Q All right. Dr. Cole, I'd like to turn now to the subject of traffic speeds and congestion --
A Okay.

Q -- which was your third major area of concern with respect to Mr. Sullivan's modeling. And Mr. Sullivan has relied on traffic projections from Costco witnesses as the basis for the amount of traffic in the case of modeling the emissions on the mall parcel, and there was substantial testimony presented by witnesses that included firsthand accounts, photography, videography that indicated that these traffic projections were understated -- traffic counts at the infamous Intersection 16, potential gas queues at the gas station and, in addition, the speed of vehicles within the parking lots and within the ring road.

MR. GOECKE: I would object. The testimony did not say that the traffic counts were understated. There were different traffic counts that were provided by members of the opposition, but they didn't, they didn't say that the actual counts and estimates provided in Costco's report was incorrect. And then, in addition to that, the last point about the average speed, I don't believe we had evidence about the average speed.

MR. GROSSMAN: Well, there was --

MR. GOECKE: Videos of --

MR. GROSSMAN: Well, there was testimony from a couple of witnesses about cars going fast or going slow --

MR. GOECKE: Exactly.

MR. GROSSMAN: -- depending on the traffic

situation, just having that statistical evidence --

MR. GOECKE: Right.

MR. GROSSMAN: -- regarding speed. I don't think there was anything additional, but I don't know -- they don't have to have statistical evidence to pose a hypothetical based on evidence that was submitted, testimonial evidence.

MR. GOECKE: Okay. So long as it's --

MR. GROSSMAN: So they can --

MR. GOECKE: So long as we agree it's hypothetical and not factual.

MR. GROSSMAN: Well, yes, I wouldn't say hypothetical. Hypothetical questions have to be premised on some evidence that's in the record. Hypothetical questions posed to an expert can't be hypothetical in the sense that they're just made up. It has to be premised on some evidence in the record, but there is evidence in the record regarding speed. Now, maybe we can hear your question again because I --

MS. ROSENFELD: Well --

MR. GROSSMAN: -- I hadn't concentrated on the point that he made an objection to. So --

MS. ROSENFELD: I'll rephrase the question.

BY MS. ROSENFELD:

Q If the evidence of record were to show that there

were more vehicles on the mall parcel or, and/or if the speed of vehicular travel were lower than assumed by Mr. Sullivan, would that have an effect, in your view, on the quantification of the emissions projected for the site?

A Thank you. That helps me give a good answer. I think I'll start with something that's fairly simple, and this is No., Slide No. 25.

MR. GROSSMAN: Can you start with a yes or a no to that question?

THE WITNESS: Okay.

MR. GROSSMAN: And then explain it.

THE WITNESS: If -- let me rephrase the question to make sure I got it right. You said if there is evidence on the record and if it were deemed to be accurate that showed more congestion or slower speeds, would that influence the judgment about emission levels and concentrations; is that right?

MR. GROSSMAN: That's essentially, go ahead --

BY MS. ROSENFELD:

Q That's correct.

MR. GROSSMAN: -- that's essentially what she said.

THE WITNESS: Okay. Okay. Then I've got it. So I want to start with a, just a basic --

MR. GROSSMAN: Start with a yes or no, if you can.

THE WITNESS: Oh.

MR. GROSSMAN: If you can't, then tell me you can't.

THE WITNESS: Which is the right answer? Did you phrase it in the negative or the positive? The --

BY MS. ROSENFELD:

Q Would it change the outcome, and if so, in what manner?

A Yes. The answer is yes.

MR. GROSSMAN: All right. Now you can give your explanation.

THE WITNESS: You can't blame me for trying to get a little coaching from the counsel.

MR. GROSSMAN: I can blame you for that actually, but I'm not going to in this case.

THE WITNESS: Okay, thank you. I appreciate that. Okay. So this figure, for a number of pollutants, based on the Federal Highway Administration, by Dr. Claggett, Michael Claggett, 2010, which we've provided for the record --

MS. ROSENFELD: For the record, it's Exhibit No. 404(c).

THE WITNESS: Right -- shows that for all of the pollutants of concern -- carbon monoxide, NOx, VOC, whoops, let me add PM2.5, PM2.5 and diesel particulate matters to the right -- no matter which of those pollutants you look

at, if you use MOVES, it shows that those emissions all go up as speed goes down. That is a fact of life. That has been verified by studies, and particularly this one which I'm citing, where they used MOVES and --

MR. GROSSMAN: Is that because the cars spend more time in a particular area because they're going more slowly, or is it because the vehicles actually have a higher emission rate when they're going more slowly?

THE WITNESS: Well, that's a good question. This chart is in grams per vehicle mile traveled.

MR. GROSSMAN: Right.

THE WITNESS: Okay. So --

MR. GROSSMAN: So they could be emitting more grams per vehicle mile traveled because they're going more slowly, rather than because the vehicles actually have a higher emission rate per se per period of time.

THE WITNESS: Let me consider that for a moment. With your permission --

MR. GROSSMAN: Yes, sir.

THE WITNESS: -- I would like to reflect on that and come back to you with an answer.

MR. GROSSMAN: Well, it depends on how much time we have in terms of cross-examination. I -- it's beginning to look like we won't finish today, including cross-examination. So I guess you can reflect because

they'll have an opportunity to cross-examine you tomorrow.

THE WITNESS: Correct. So you're asking, if we looked at grams per second rather than grams per vehicle mile --

MR. GROSSMAN: Right. Essentially, that's another form --

THE WITNESS: Okay.

MR. GROSSMAN: -- of that question. I mean, the point is that --

THE WITNESS: Right. It's my -- yeah.

MR. GROSSMAN: -- if the vehicle is going more slowly, it's going to spend more time --

THE WITNESS: Right.

MR. GROSSMAN: -- in a given area. It may not be emitting more per second, but it just is going to be there longer.

THE WITNESS: Yes. I think that's a really, a good question. I think -- and I will say more on this --

MR. GROSSMAN: Okay.

THE WITNESS: -- but cars that are idling are, or running at slow speeds, are less efficient than cars that are moving freely. And there is some evidence, I don't know if I put it in a slide -- no, unfortunately.

MR. GROSSMAN: I'll tell you one thing. If I see --

THE WITNESS: I will --

MR. GROSSMAN: -- if I see emissions coming out of my tailpipe the size of those cherry tomatoes on Slide 30, I'm going to --

THE WITNESS: Yes.

MR. GROSSMAN: -- begin to worry.

THE WITNESS: Yeah. You --

MR. GROSSMAN: All right.

THE WITNESS: That's conceptual.

MR. GROSSMAN: All right, sir.

THE WITNESS: I will have something to say on that because I have some further evidence.

MR. GROSSMAN: All right. But you partially answered it by saying that cars going slowly are less efficient. So that's --

THE WITNESS: Yes.

MR. GROSSMAN: -- a part answer to that question.

THE WITNESS: Yes, it's a part answer. I will attempt to give you a fuller --

MR. GROSSMAN: All right.

THE WITNESS: -- answer. Okay. So that's the first part of the answer to the question as why vehicle speed matters in terms of emissions, okay?

MR. GROSSMAN: Right.

THE WITNESS: Now, what I've tried to do is put

together a conceptual framework or model -- not a mathematical model, but a conceptual model -- that shows the complexity of these situations and what I call the compounding effects. For example --

BY MS. ROSENFELD:

Q Excuse me. Dr. Cole --

A Yeah.

Q -- before you get there, would you go back to Slide 24, please, because I think you did cover the issue of vehicle speed, but I'd like you to speak just for a moment, as well, about congestion.

A Okay. I want to acknowledge that the base diagram from this comes from the cited source, the Federal Highway Administration Traffic Congestion study; however, I've added, taken some liberty to add some lines to make it more intelligible. You don't --

Q And for the record --

A -- the results of what I'm going to say are regardless of which axis, which horizontal axis you use.

So let me, let me explain this diagram so that we're on the same page. The vertical axis is the delay in hours per vehicle. So I've marked one-quarter hour and one-half hour just to give you a framework. You could look at 10 minutes if you wanted. The horizontal axis that was in the original report is the ratio of average traffic,

hourly capacity, I'm sorry, the average daily traffic over the hourly capacity. So, because you're dividing by a daily numerator by an hourly capacity, these numbers look big. I don't know where you would get, you know, 20 or 15 times the capacity. I mean, you just couldn't fit that number of vehicles. So to make it a little simpler, I made some assumptions about peaks and shifted the, or changed the readings on the axis so that it was hourly traffic values over hourly capacity, so that --

MR. GROSSMAN: That seems to make more sense. I'm not quite sure why they did that, the ratio of average daily traffic over --

THE WITNESS: Yeah. I --

MR. GROSSMAN: -- I don't quite understand that.

THE WITNESS: You see why I --

MR. GROSSMAN: Yes.

THE WITNESS: It just didn't make sense. So if you use my analysis -- and you could, you could change this around; it doesn't depend -- anything above 1.0 means over capacity. Below 1.0 in my framework is under capacity. So now, which of those curves do we look at? The steepest of those curves, I think it's blue, this curve right here, is what's called a bottleneck curve. A bottleneck curve, according to this study, is what happens when you have bottlenecks due to volume. The other two curves have to do

with interference, such as an accident or a, let's say, construction or a snowbank or something that physically interferes.

MR. GROSSMAN: Let me see if I understand --

THE WITNESS: Yeah.

MR. GROSSMAN: -- why you do this analysis. Where in the mall are you considering applying this analysis to? Is this supposed to be because of the queue at the gas station, or is it because of some backup entering the mall, or where are you looking at this traffic consideration?

THE WITNESS: Well, right now what I'm trying to show is the relationship between the number of vehicles and the delays. Delays --

MR. GROSSMAN: I understand, but if there are no, if there are no delays --

THE WITNESS: Okay. All right.

MR. GROSSMAN: -- on the ring road --

THE WITNESS: Yeah.

MR. GROSSMAN: -- and the only --

THE WITNESS: The question -- oh, sorry.

MR. GROSSMAN: -- and the only -- because I saw your reference in your materials to queues. The queues that we've talked about here are queues of people lined up to get gas. They're not the normal highway bottleneck queues that some of these curves from Highway Transportation may apply

to. They're queues for gas. Now, there -- and there was another discussion from Ms. Cordry about some backups getting into the mall, but I don't know that those, that you could argue they have an impact here because there's going to be some increase in traffic to get to the gas station, but I don't think those are what you're talking about. So I'm just trying to find out what you're applying this curve --

THE WITNESS: Okay. Let me, let me --

MR. GROSSMAN: -- this curve's bottleneck delay analysis to. I understand the curve. I just want to know what you're trying to apply it to in the mall.

THE WITNESS: Right. Okay. So I want to go back to Ms. Rosenfeld's question, which is correct.

MR. GROSSMAN: That's how we got into this mess. Go ahead.

THE WITNESS: If in fact the speeds were lower, there was more congestion --

MR. GROSSMAN: Right.

THE WITNESS: -- how would that affect emissions?

MR. GROSSMAN: Okay.

THE WITNESS: What I showed, the previous slide --

MR. GROSSMAN: Right.

THE WITNESS: -- showed that using MOVES, the slower the speed, the greater the emission rate from motor

vehicles.

MR. GROSSMAN: Right. I understand the relevance of the curve to answer Ms. Rosenfeld's question --

THE WITNESS: Right.

MR. GROSSMAN: -- but I'm going one step beyond her question, and that is, so what do you apply this to? I mean, we've had testimony --

THE WITNESS: Okay. All right.

MR. GROSSMAN: -- from some, anecdotal testimony from some folks about cars backing up in the, you know, intersections entering the mall, but I'm just trying to find out what you're applying this to --

THE WITNESS: Okay. That's fair.

MR. GROSSMAN: -- and I'm just wondering whether you were trying to apply it to the queues for people waiting to fill up their tank, which are theoretically not supposed to come out onto the ring road.

THE WITNESS: No.

MR. GROSSMAN: Okay.

THE WITNESS: The queues, they're going at --

MR. GROSSMAN: You're just talking about people traveling on the ring road?

THE WITNESS: The queues of -- cars are idling. I don't think that's in dispute, right?

MR. GROSSMAN: Right.

THE WITNESS: Okay.
MR. GROSSMAN: Well, they may be in -- they're not supposed to idle --
THE WITNESS: The number of cars, the length of time, and all of that, maybe --
MR. GROSSMAN: Okay. Right. Okay.
THE WITNESS: -- but idling is idling, right?
MR. GROSSMAN: Well, they may be idling, or some of them may have their engines off if it's too long, but I don't know.
THE WITNESS: Okay. And some, some, remember, are entering and exiting.
MR. GROSSMAN: Right.
THE WITNESS: The entrances and exit, it's my understanding, are in very close vicinity to parking areas. There are other --
MR. GROSSMAN: Well, clearly the exit is.
THE WITNESS: -- there's both the warehouse, the tire place, the tire whatever it is. There are shops. There's the mall entrance. So that parking lot is being used by a lot of different cars that are coming in --
MR. GROSSMAN: Okay.
THE WITNESS: -- from some of the same exits, or going in at the same entrances and leaving from the same exits, et cetera.

MR. GROSSMAN: Okay.
THE WITNESS: There are also, as I've said, there are trucks, big trucks pulling into the loading dock. Now, I'm not talking about the loading dock emissions right now. I'm talking about --
MR. GROSSMAN: Right.
THE WITNESS: -- the compounding effect; that loading docks or tankers coming into a gas station, people having multiple points of views, that creates congestion. So my curve applies, to answer your question, my curve applies to those situations.
MR. GROSSMAN: Well, it seems to me that the curve that would apply is the curve that shows that there's an increase in emissions at slower speeds if you accept this testimony and factor it in that there are going to be more, traffic going more slowly than was previously estimated. But I don't know that the charts you show on Slide 24 really describes any situation that we have in this mall, because it's really talking about highway backups --
THE WITNESS: Okay. I'm going to --
MR. GROSSMAN: -- and the impacts of bottlenecks on highway backups. I don't know that that has any, any relevance to this at all. I'm not discounting what you said about slower-speed traffic having an increase in the volume of pollutancy. I understand that and what you testified to.

I just don't see this --
THE WITNESS: Okay.
MR. GROSSMAN: -- particular page, 24 chart --
THE WITNESS: I hope that 22, Slide -- whoops. I hope that this sheds some light --
MR. GROSSMAN: Okay.
THE WITNESS: -- on it. Maybe it will, maybe it won't, but let me try.
MR. GROSSMAN: That's page 22?
THE WITNESS: Yeah, but it has an extra little box, and it's on there.
MR. GROSSMAN: Okay.
THE WITNESS: Okay. So -- notice I'm using your pointer.
MR. GROSSMAN: Yes. I feel rewarded.
THE WITNESS: Thank you. Number of vehicles, okay? This curve that I showed shows that -- and it's common sense -- that with the, as the number of vehicles increase and the ratio between the volume of vehicles and the capacity increases, you have more congestion.
MR. GROSSMAN: Right.
THE WITNESS: Okay? The number of vehicles has an impact on vehicle speed. The number of vehicles also has an impact on emissions.
MR. GROSSMAN: Right.

THE WITNESS: So if you're off on the number of vehicles, which was the premise of the question, then you're going to be low in this way, you're going to be low, you're going to be low in terms of vehicle speeds. The lower the vehicle speeds, the more -- the lower the emissions.
MR. GROSSMAN: Higher the emissions.
THE WITNESS: Right, higher the emissions. Thank you.
MR. GROSSMAN: I understand exactly what this chart is saying --
THE WITNESS: Yeah.
MR. GROSSMAN: -- and I understand your point. I'm just saying I don't think your Federal Highway chart is relevant to this because I think that applies to an entirely different set of circumstances. I don't think you can use a bottleneck curve to describe --
THE WITNESS: Okay.
MR. GROSSMAN: -- from highway traffic, to describe what's happening here, but your general point is understood. So I don't think you really have to go further than that. Okay. Ms. Rosenfeld.
THE WITNESS: I would like to call your attention to the conclusions from this Federal Highway study on congestion.
MR. GROSSMAN: Okay.

THE WITNESS: So the first one says: The exponential growth in bottleneck delay after the onset of congestion is a major reason why it is so difficult for agencies to keep up with congestion: once congestion starts, things get bad quickly.
MR. GROSSMAN: Right.
THE WITNESS: That's the nature of the exponential curve.
MR. GROSSMAN: I understand that --
THE WITNESS: All right. Okay.
MR. GROSSMAN: -- but I don't want to apply a Federal Highway curve, especially -- I don't need to apply that. I have other evidence by which to analyze this --
THE WITNESS: Okay.
MR. GROSSMAN: -- case. That's a curve that doesn't truly apply to this situation --
THE WITNESS: So you --
MR. GROSSMAN: -- a bottleneck curve of that sort.
THE WITNESS: I hear you saying that this, you understand this --
MR. GROSSMAN: I understand.
THE WITNESS: -- you understand the compounding of errors that can occur here.
MR. GROSSMAN: Well, I understand the point you're making. Whether or not I accept the argument I'll have to

figure out later when I consider all the evidence.
THE WITNESS: Okay.
MR. GROSSMAN: Okay.
THE WITNESS: So this is my, one of the pieces of evidence that I provide to answer --
MR. GROSSMAN: I understand.
THE WITNESS: -- Ms. Rosenfeld's last question, okay?
MR. GROSSMAN: I understood. Ms. Rosenfeld, do you want me to take a five-minute break here, because we are --
MS. ROSENFELD: That actually would be helpful. I think we're getting --
MR. GROSSMAN: All right.
THE WITNESS: Yeah, that -- I would like that too.
MR. GROSSMAN: Not for you. You're going to have to stay. Just teasing. Yes, you get a break too.
THE WITNESS: I'll stay if you stay.
MR. GROSSMAN: Let's be fair now.
MS. ROSENFELD: I would appreciate that.
MR. GROSSMAN: All right. And we'll come back at 10 to 4:00.
MS. ROSENFELD: It would help me to -- we've covered a lot of ground. Let me --
MR. GROSSMAN: Right.

(Whereupon, a brief recess was taken.)
MR. GROSSMAN: All right. Ms. Rosenfeld, it's up to you.
MS. ROSENFELD: Okay.
BY MS. ROSENFELD:
Q Dr. Cole, I'd like to turn for a moment to the physical characteristics of PM2.5 emissions but, even more particularly, the physical characteristics of ultrafine particulates. And let me start, start this way: The EPA regulates PM2.5, is that correct?
A They regulate PM2.5.
Q And is there a subcategory of PM2.5 known as ultrafine particulates?
A There are.
MR. GROSSMAN: You mean is a subcategory recognized by the EPA or just in general?
MS. ROSENFELD: That was my next question.
BY MS. ROSENFELD:
Q Does the EPA recognize ultrafines as a separate subcategory?
A It's not regulated.
Q It's not regulated?
A There's not a standard, a separate standard for ultrafine particulates.
Q Do ultrafine particulates have different physical

characteristics from larger, or could you explain why they're called ultrafine as opposed to something else?
A Let me take a step back, if I can, and say that if we look at the standard of PM2.5, it covers a multiple of sins. There are particles and there are particles. The particles vary in terms of the size distribution. As Ms. Rosenfeld said, there are bigger particles, there are intermediate particles, there are very fine, ultrafine. Okay. They do have very different effects. And the other thing that's different from one particle to the next is its composition and its source: Is it, does it have metal in it? Does it have a heavy, toxic heavy metal, or does it, is it carbon?
What I'm saying is that the PM2.5 standard is a category that lumps things that have a variety of toxicity and yet the same study, the same standard, rather, covers every situation. So the premise is one that's being investigated by EPA and by its Clean Air Advisory Council, CASAC. There's the issue of how do we, how do we become more refined in our analysis. So, for example, it's known, well-known that vehicle emissions contain heavy metals and -- which adds to their toxicity. Some kinds of particulates don't have heavy metals.
Now, I want to get directly to the question of particle-size distribution, and to do that, did you want me

to look at a --
Q Slide 29, I believe.
A What? This is a graph from the National Center for Atmospheric Research, one of the premiere meteorological research institutes in the nation. They have a group that works on ultrafine particles, and this is a very useful graph because it shows another related problem with the PM2.5 standard the way it's currently written.
So it turns out that if you look at the bottom curve, the mass is concentrated in the coarser particles. So the bulk of the standard, you may have 10 percent of the particles containing the majority of the mass, but if you look at the number of particles, you'll find that the numbers are highest, the greatest counts are in the ultrafine particle range.
MR. GROSSMAN: What's the smallest size that's considered an ultrafine particle and below which --
THE WITNESS: Well --
MR. GROSSMAN: -- you are no longer talking about particles but talking about something else in terms of air modeling and air pollution? I mean, I know --
THE WITNESS: Well, in this particular --
MR. GROSSMAN: -- particles in the physics sense goes infinitely tiny, but --
THE WITNESS: Here we're looking at micrometers or

micrometers or mu's, and they have a cutoff at .01. It's varied. I've seen different definitions.
MR. GROSSMAN: Okay. So it goes from .01 up to 2.5? Is that --
THE WITNESS: The ultrafines in this particular diagram are from .1 micrometer to .01 micrometer. Now, those are very small particles.
MR. GROSSMAN: Okay.
THE WITNESS: So now, the third curve is in the middle, which is surface area. And there we see that there's very little surface area in the coarse particles, and I think the, on this slide it's yellow, but the difference between the yellow and white here is about at the standard of 2.5. So anything below this level is 2.5, okay? So PM10, for example, would be greater than 10 here.
So my point on surface area is that the majority of -- now, what are we talking about when we talk about surface area? I think it would help to show the next slide. Now, I have to confess, these are not micron electroscope diagrams of particulates. On the left we see cherry tomatoes, in the middle we have couscous, and on the right we have sugar. So my point is conceptual.
MR. GROSSMAN: Is that powdered sugar or --
THE WITNESS: Well, I could have added yet another one. So what we're looking at is a lot of mass contributed

by a small number of large particles, a huge number of particle --
MR. GROSSMAN: I got that point from your charts, but --
THE WITNESS: Okay.
MR. GROSSMAN: -- on your chart on page 29 --
THE WITNESS: Yeah.
MR. GROSSMAN: -- or Slide 29 -- whoops, you slid into oblivion.
THE WITNESS: I did. I --
MR. GROSSMAN: You're caught in Windows 8 hell.
MS. ROSENFELD: Yes.
THE WITNESS: Where's my son when I need him, you know? All right. Go back to square one. Here, where's that little -- here we go. There we go, and now we're going --
MR. GROSSMAN: On page 29.
THE WITNESS: Okay. All right. You had a question?
MR. GROSSMAN: Yes. It shows the category of ultrafine particles, as you say, between 0.01 and 0.1.
THE WITNESS: Yep.
MR. GROSSMAN: What falls into the category of, between .001 and .01? What do you call that? They have it on the chart, but they don't name it.

THE WITNESS: Okay. That's a good question. Well, you're getting pretty close to the molecular level, where you have condensation that's occurring, where vapors are condensing and forming very small nuclei. It might be in the range of Aitken, what are called Aitken nuclei, but those tend to coalesce and form ultrafine particles as those agglomerate.
MR. GROSSMAN: All right. So we don't have a name for them right now.
THE WITNESS: I can get that for you.
MR. GROSSMAN: So, basically, when you're talking about ultrafine, you're talking about .1 to .01 micrometers --
THE WITNESS: Yeah, right.
MR. GROSSMAN: -- in diameter?
THE WITNESS: Right.
MR. GROSSMAN: All right.
THE WITNESS: And my main point is that while they contribute very little mass, as is shown in the bottom, they contribute the majority of particles. Okay?
MR. GROSSMAN: Little mass, lot of mess.
THE WITNESS: Right. Surface area -- there's a relationship between particle diameter and surface area. Now, here we're talking about the collective surface area, let's say what's in a cubic meter of air.

MR. GROSSMAN: Right. Why do I need to know that? I mean, that's an obvious geometric thing, but --
THE WITNESS: Right. I'm going to tell you why you need to know it.
MR. GROSSMAN: Okay.
THE WITNESS: You need to know it because those ultrafine particles and a tremendous surface area are ideal locations for the deposition and absorption of other contaminants. For example, gases may condense on the surfaces of these tiny particles. For example, one well-known chemical that condenses on these ultrafine particles is polyaromatic hydrocarbons, some of which are known to be carcinogens.
So there's, my overall point is there's a huge difference between, if you're at the standard and -- let's say it's just under the standard or something and most of that standard is weighted by these coarser particulates. Those are not as toxic because -- for a number of physical reasons. I gave you the surface area. The tiny particles, and I'm not a health expert, but others will testify that ultrafine particles penetrate and are retained deep in the respiratory system, in the lungs.
MR. GROSSMAN: If I take that as a given, the question is, if there's no standard set up for them, how am I supposed to assess what is problematic or prohibited?

THE WITNESS: Okay. What I'm trying to suggest is in the realm of uncertainties, that where do you err in making a judgment? So if you're looking at vehicle emissions -- and there's evidence that vehicle emissions are a major, major source of ultrafine particulates in urban air, in ambient air, motor vehicles --
MR. GROSSMAN: I get your point.
THE WITNESS: Okay.
MR. GROSSMAN: So you're saying that even though they're not regulated directly, they, the fact of their existence and their impacts add to the uncertainty factors in the calculations.
THE WITNESS: Yes. So --
MR. GROSSMAN: Okay.
THE WITNESS: -- that's another area of uncertainty that needs to be incorporated in decision-making aimed at protecting public health.
MR. GROSSMAN: I understand.
BY MS. ROSENFELD:
Q Dr. Cole, let me ask the question this way --
A Yeah.
Q -- if the levels of PM2.5 in Mr. Sullivan's report are understated, would the levels of ultrafine pollutant concentrations also --
A I'm sorry. I can't hear your question.

Q Sure. If the levels of PM2.5 are understated in Mr. Sullivan's report, would the concentrations of ultrafine pollutant concentrations also be understated?
A Yes.
Q I'd like to refer you to Figure 19 of Mr. Sullivan's August 2013 report, and --
A Yeah. Figure 19, you say?
Q Yes, I believe.
A What page is it?
Q Page 29 of his August '13 --
A Okay, got it, yeah.
Q -- August 2013 report. Under Figure 19 what is the projected level of PM2.5 that he's predicting under the urban dispersion model on the mall parcel?
A Okay. The maximum is 11.2.
Q And can you remind us what the standard is, please?
A The standard is 12.
Q Okay. You had spoken earlier about scientific standards, and in your experience, scientific modeling typically includes a margin of error or some sort of statistical --
A Say that again. What?
Q Some sort of statistical --
A But what is it that includes?

Q Scientific modeling reports.
A Well, any kind of analysis where there are predictions made, where models or other calculations are made the standard is to have some understanding of the uncertainties involved, okay? For example, that's why you see scientific reports with error bars -- plus and minus are standard, are two standard deviations -- because, and there's also a prediction called probable errors, which look at the, which even include equations for compound or errors that propagate because there's more than one variable that contribute to the uncertainty, okay? And I -- if you're asking whether that's the norm, and I believe in a case where you're looking at, where the issue is protection of public health, where you're close to standards or exceeding standards, as is the evidence presented in, that you just cited, the 11.2 is very close to 12, and so now the uncertainties become very, very critical because, as the applicants have -- I don't totally agree with it -- but have chosen the standard, the standards as, as the goal, the air quality standards as the thing to measure against --
MR. GROSSMAN: What don't you -- you don't totally agree with having, applying the National Ambient Air Quality Standards?
THE WITNESS: No, no, no. No. Let me back up so I don't get -- the hour is late. I may be getting a little

fuzzy. Give me your question again.
BY MS. ROSENFELD:
Q The hour is getting fuzzy.
A I get lost.
Q The question was, is it typical in a scientific report such as this modeling analysis to have some sort of either an error bar or measure, margin of error?
A Okay. So the answer is yes, that's a normal procedure. So you're aware of, well, what are the odds that I could be wrong in my best shot. You're looking at a best shot, okay?
Q And does that become more important as you come close to a standard?
A I would say so, because if, I mean, you're at one-tenth of the standard and you have a 50 percent chance of being wrong, it's not a big deal. If you're at 11.2, even using the urban model, and you have many uncertainties in the analysis, those uncertainties really take on a critical import.
MR. GROSSMAN: I understand that point. I don't think we have to belabor that anymore, but you started to preface your answer with a statement that applicants have chosen to apply the National Ambient Air Quality Standards, I may not totally agree with that, but -- and then you went onto something else.

THE WITNESS: Okay. Right.
MR. GROSSMAN: If you don't agree with that, is that the case --
THE WITNESS: I think it's a, I think it's a good --
MR. GROSSMAN: -- and if not, why not? What do you, what standards do you apply?
THE WITNESS: I think it's a good starting point, but then you have to look into the issues that add uncertainty to that analysis because you're dealing with a critical matter, which is public health. You're going to hear testimony from health experts about things that happen even below the standards, and I've pointed out with this diagram that not all particulates have the same impact because they have different physical and chemical characteristics. So given that, if you're going to use the standard and you're very close to it, it would behoove you to use conservative assumptions down the line so that you don't inadvertently err on the low side when you're dealing with public health.
MR. GROSSMAN: Well, I understand your point about that, but you're not suggesting there's some other set of standards that should be used as the guidance?
THE WITNESS: My own view, having some experience, what I said, public health assessments around things that

are toxic -- air pollution sources, hazardous waste sites, and whatnot -- is that a health assessment is a lot more than just looking at standards. You're looking at issues like sensitive populations, sensitive, we could call them sensitive receptors, but these are people.
So, so the answer is, where the issues do no harm to public health -- and I'm not venturing into toxicology here -- but where there's an issue involving public health, a more rigorous assessment of the impact of the particular emissions would, in my opinion, in order to protect people both in the mall and who live, who are going to be exposed over long periods, that there be more than just a comparison with standards which is riddled with the kinds of uncertainties that I've discussed here: the fact that particulates contain a multiple of sins. Some are like serial killers. Some are like minor offenders, okay?
MR. GROSSMAN: I understand what you're saying. I have to be careful because I'm not a health official, and I can't just arbitrarily pick out a set of standards to apply to people. That's not fair to applicants. It's not fair in general. So I have to go by some set of standards to guide me.
Now, on the other hand, it's also true that there's a concept in our land use law of site conditions, and this is a site condition -- that is, what's immediately

around the site. So it does factor in but not perhaps in terms of what is the standard, because I am concerned about applying something that is not a recognized standard in the way that might be suggested in your answer, as distinguished from applying the standard and then considering even applying that standard to what's in the area. So there's a distinction in my mind, but in any event --
THE WITNESS: Can I respond or --
MR. GROSSMAN: Sure. Why not?
THE WITNESS: Okay. So let's take your premise that, you know, here you are, you have to make a decision, you would like to use something that is a regulatory standard, right?
MR. GROSSMAN: Well, actually, I have to make a recommendation, but that's --
THE WITNESS: Yeah. Okay. Then I would ask you to consider issues of uncertainty and look at the results that have been presented to make the case whether there are exceedances of standards or not, to look at the distance, to look at the results --
MR. GROSSMAN: I understand the uncertainty issue, and we've gone over that lots of times.
THE WITNESS: So the uncertainty issue, so I -- my viewpoint is that in a situation like this you use conservative assumptions.

MR. GROSSMAN: I understand. I mean, we've -- I don't want to go over that territory more than another three times. We've already --

BY MS. ROSENFELD:

Q Dr. Cole, during the course of this process, you and Mr. Sullivan met to discuss a protocol --

A Uh-huh.

Q -- and we're now at, I assume, nearing the end of that process. Having reviewed the various iterations of successive reports that Mr. Sullivan has provided, ending most recently with the one of August 2013 --

A Uh-huh.

Q -- in your opinion, has he adhered to the understandings that were established at the time of the protocol?

A The protocol, the process of discussion, we had points of agreement and points of disagreement. One of the things that was, at least I thought, favorable was the issue of conservatism, building into the analysis conservatism. And I'm deeply concerned that every time an analysis shows an exceedance or a near exceedance there's a backing away from conservatism in the analysis. That's happened at several different junctions.

For example, the NO2 analysis was fine and showed no exceedance until the background error on conversion was

corrected. Then suddenly a lot of these modeling projections showed exceedances, and at that point, we begin to get reductions in emissions. I don't feel that's a valid scientific approach. I think that's, frankly -- frankly, it's backing away from the statements that were made early in the process, and I have a lot of trouble with that, particularly given these two pollutants, one-hour NO2, annual PM2.5, either close to the standard or exceeding the standard, depending upon which of the assumptions you use, okay, that -- I think you see my point. It's --

MR. GROSSMAN: I do.

THE WITNESS: -- I don't want to ascribe motives, but it's deeply disturbing as a scientist to see the methods shift when certain answers occur.

MR. GROSSMAN: Let me ask you this: If I recall, when you wrote to the Planning Board, you said, you suggested that there be an actual monitoring period --

THE WITNESS: Uh-huh.

MR. GROSSMAN: -- is that correct?

THE WITNESS: That's correct.

MR. GROSSMAN: So what if in this case the Board of Appeals were to order that there be a monitoring period for PM2.5 and for NO2 prior to any operation of a gas station and then it be allowed to operate at some level and continuing monitoring for some period of time to see if it

was creating the problem that is feared -- would that be a workable solution?

THE WITNESS: Not for me.

MR. GROSSMAN: Why not?

THE WITNESS: Because it has to do with, it has to do with the issue of location, in my opinion. Do you put a major source, a major gas station of an unprecedently large size in the county so close to receptors?

MR. GROSSMAN: So why did you recommend monitoring? What's the point then if you're not going to have any gas station?

THE WITNESS: The point? I'll tell you what the point is. The monitoring, first of all, would have to take several years to get a representative value. Secondly, let me get my train of thought, the monitoring is a sense of what's coming into the area, what's, you would put background monitors -- you would put a series of monitors, let's say, in the mall itself and adjacent to the mall in the neighborhoods, okay? So you would do that, let's say, for three years. In other words, you would have, you would have background monitors which reflected the air coming into this area.

MR. GROSSMAN: Right, but what's the point in doing that? Let's say you had this three-year scenario. I was thinking more in terms of less than that, but let's say

you had a three-year scenario. What's the point in recommending three years of monitoring if you're nevertheless, whatever the results are, not going to allow this gas station? What's the point? I don't understand.

THE WITNESS: There are two issues here. One is the issue of what would be a scientifically valid measurement of background. My point was that I felt the sites that were used were not representative of conditions in the, in the area, in the area of the mall.

MR. GROSSMAN: Right.

THE WITNESS: Now, they attempted, Mr. Sullivan attempted to bridge that gap by modeling a region around the mall with using MOBILE6 and the emissions on the roadways, the ring road, what have you. In my opinion, that doesn't affect all of the sources of pollutants in what I call the near-field particulates.

MR. GROSSMAN: But you haven't referenced my question.

THE WITNESS: I'm trying.

MR. GROSSMAN: My question is, what is the point in your recommendation of monitoring this area if in fact you're still opposed, no matter what the results are, to the proposed gas station? I don't understand. That seems inconsistent to me. I could understand if you said, if you sent a letter to the Planning Board and said there shouldn't

be a gas station here for all of the reasons that you may have said here, uncertainty, whatever you want, but I can't understand your sending a letter, saying let's have monitoring for X period of time to have this baseline, if you're opposed nevertheless, no matter what the results. That seems to me to be an inconsistent position.

THE WITNESS: There are two -- I'm trying to explain this. One is the issue of scientific validity and uncertainties: how do you get the best -- is, is what the applicants have submitted sufficient or is it flawed?

MR. GROSSMAN: Try to answer my question. What is the point of requiring monitoring if, no matter what the results, you are not going to allow the special exception?

THE WITNESS: There are many -- monitoring isn't going to give you the whole answer. I see, I see your point.

MR. GROSSMAN: What's the point in having any monitoring --

THE WITNESS: All right.

MR. GROSSMAN: That's why I don't understand your -- I don't understand your --

THE WITNESS: Okay. I see your point.

MR. GROSSMAN: -- recommendation to the Planning Board.

THE WITNESS: I see your point.

MS. ROSENFELD: Maybe I can help.

BY MS. ROSENFELD:

Q Dr. Cole, was your recommendation for monitoring to establish background in the immediate area --

A Yes.

Q -- before anything was built, so there would not be speculation --

A Yes.

Q -- about background?

A Thank you. Yes.

Q You were not suggesting monitoring after the station was built, correct?

A Correct.

MR. GROSSMAN: But still, that doesn't answer my question. Why go to the expense of monitoring what's happening in the area if you're never going to use it towards measuring the results of a station? I don't understand the --

THE WITNESS: All right. Let me, let me now give you another answer.

MR. GROSSMAN: Yes.

THE WITNESS: Remember that when you're putting in monitors before the fact, you're measuring what's called existing conditions --

MR. GROSSMAN: I understand.

THE WITNESS: -- existing conditions. That's all the monitoring will give you.

MR. GROSSMAN: Right. I understand that.

THE WITNESS: There's a whole other set of analysis that has to be done. Will it be done the right way? Will it be done using, covering the uncertainties?

MR. GROSSMAN: Apparently I'm not making my point clear --

THE WITNESS: No, because --

MR. GROSSMAN: -- because -- why go to the trouble of measuring the existing levels in the area if you're never going to use them for anything? You're never going to use those measurements for anything because there's no --

THE WITNESS: No. Excuse me. You're going to use them because you need to add what's already there to the projections for a gas station --

MR. GROSSMAN: Yes, but you've told me --

THE WITNESS: -- they're two different things.

MR. GROSSMAN: But then you answered my question as to, well, then you're saying, let's say you monitor it for three years and you get figures, but you're never going to have a gas station anyway. So you're not adding into the gas station.

THE WITNESS: I didn't say that.

MR. GROSSMAN: Oh, I thought that's what you said.

You said --

THE WITNESS: No, I didn't say that.

MR. GROSSMAN: -- in your mind, you would not, you would not recommend the gas station.

THE WITNESS: I said, I said it's a bad location for a number of reasons. I think we'll discuss that in greater detail when we talk about non-inherent site factors here, but what I'm saying is, that's one piece of a bigger analysis. You're just saying, you're adding -- you have existing conditions.

MR. GROSSMAN: I understand that point, but you apparently don't understand my question. So let's just go on. I don't want to waste any more time on it. Go ahead, Ms. Rosenfeld.

MS. ROSENFELD: Mr. Grossman, I have one more subject to cover, and it's going to take a little bit of time. It is late. Can we resume in the morning? I suspect it'll take half an hour or less, but we've spent more time on this than I expected.

MR. GROSSMAN: That's because that pesky Hearing Examiner keeps asking questions.

MS. ROSENFELD: I welcome the questions. I'm glad you ask them.

MR. GROSSMAN: What's your pleasure, Mr. Goecke?

MR. GOECKE: We prefer to use the full day just

because --
MR. GROSSMAN: Well, the full day is only 10 minutes longer because --
MR. GOECKE: I understand, but --
MR. GROSSMAN: Okay.
MR. GOECKE: -- I mean, it's your decision, but --
MR. GROSSMAN: All right. Well, let's go ahead and do as far as we can until 4:45.
BY MS. ROSENFELD:
Q Just one final question on the PM2.5. Is it your opinion that if the PM2.5 were properly modeled, that it would, that the concentrations would be below or above the EPA standards for annual?
A Well, as I said previously, the emission factors that were used for particulates are much lower for MOBILE6 than they are for MOVES10 by a factor of 10. There's the uncertainty associated with departing from EPA's guidance on dispersion coefficients and whether those judgments are appropriate, okay? I believe that given all of the uncertainties, that we ought to be using the rural coefficients or at least using what Mr. Sullivan says is the intermediate.
So when you begin to look at those errors in combination or those assumptions, assumptions in combination and being that you're at 11.2 using his own figures, that

suggests that there is a potential for exceeding the PM2.5. Now, I think in the area of NO2, I would go as far to say that an exceedance is likely --
Q Okay.
A -- if you correct, if you follow, if you follow EPA's guidance.
MR. GROSSMAN: I take it that the NO2 standard you're talking about is the 24-hour one?
THE WITNESS: No. It's one hour.
MR. GROSSMAN: Oh, I'm sorry, the one-hour standard.
THE WITNESS: It's the PM2.5 annual, the one-hour.
MR. GROSSMAN: The one-hour standard, yes. Okay.
BY MS. ROSENFELD:
Q And if you had been hired by Costco to conduct the analysis, what modeling protocol would you have followed?
A I have to tell you, it's a -- would you call that a hypothetical?
Q I would call that a hypothetical.
A I, well --
MR. GROSSMAN: I guess another way of asking it is, what is the appropriate modeling protocol to follow?
THE WITNESS: Right. I would use MOVES. If I found it difficult to use MOVES because I couldn't get the exact data and I didn't want to use defaults -- apparently

Mr. Sullivan decided not to use defaults; he didn't explain why, but he stated that he didn't use the more readily doable or feasible MOVES using default values -- so if I were doing it, I would have either used MOVES the best I could, using the best available data; if I couldn't do that, I would use correction factors based on the evidence from EPA and the Highway Administration and other sources to adjust the concentrations upward to reflect what is EPA's regulatory model for emissions, particularly when EPA has gone to great lengths to explain to the world why MOBILE6 is no longer a valid model, why it's been replaced.
MR. GROSSMAN: And from your earlier testimony, you would've used AERMOD as the --
THE WITNESS: Oh, I would.
MR. GROSSMAN: Okay. All right.
THE WITNESS: I would use AERMOD.
BY MS. ROSENFELD:
Q And in your experience, over time has EPA gotten more stringent or less stringent with the NAAQS standards?
A With the National Ambient Air Quality Standards?
Q Yes.
A They've generally come down.
MR. GROSSMAN: When you say come down, just for clarity of the record, you mean they have --
THE WITNESS: Been reduced to lower, more

stringent levels.
MR. GROSSMAN: Have been -- okay.
THE WITNESS: Yes. Right. For example --
MR. GROSSMAN: I understand.
THE WITNESS: -- PM2.5 was recently lowered from 15 to 12. The NO2 standard, my memory is a little bit more fuzzy on that, but it was lower.
MR. GROSSMAN: Right. I understand that.
THE WITNESS: Okay.
MR. GROSSMAN: I just wanted to know -- you said that they had been reduced. I wanted to make sure what that meant.
THE WITNESS: Yeah.
MR. GROSSMAN: Okay. Go ahead.
BY MS. ROSENFELD:
Q And, Dr. Cole, do you have just general observations to make about how easy or difficult it was to find the data, any information to evaluate Mr. Sullivan's conclusions?
MR. GROSSMAN: I'm not sure what that question means, but maybe if you know --
THE WITNESS: Well --
MR. GROSSMAN: -- if you have an answer, I'll listen to it.
THE WITNESS: Yeah. I found it difficult as an

evaluator, as a scientist evaluating a study, because there were so many different revisions, presentations where certain assumptions were changed. It's not always clear exactly what assumptions were changed in what particular analysis. You really have to dig to get it. Certain pieces of critical information were not provided.

If I'm not mistaken, you've asked -- a concern of yours is about the incremental impact --

MR. GROSSMAN: That's true.

THE WITNESS: -- of the gas station, not just at the edge, but in the entire neighborhood, which includes the mall. We asked for that analysis, and frankly, it's, there's been no analysis to get at that issue. The only analysis we have is where you expect the contributions, the incremental contributions to be lower, which is at the margins and not in the mall itself. And I've showed evidence, strong evidence, indicating, from their reports, showing that in fact there is a substantial incremental addition of oxides of nitrogen, or NO2 in this case, to the background, to the, at the source, which includes entrances and exits and all of the interferences and all the vehicles that are involved. Those -- when you look at the evidence that's available, you see the area of maximum in the area of the mall. We asked for that analysis. I believe it was something important to you. We were told that that was not

done. It's certainly not in any of the reports.

MR. GROSSMAN: Okay. Ms. Rosenfeld.

MS. ROSENFELD: All right. I'm sorry. What?

MR. GROSSMAN: No. I was just saying, you have time for one more question --

MS. ROSENFELD: Okay.

MR. GROSSMAN: -- or maybe half a question.

MS. ROSENFELD: I'll start the question.

BY MS. ROSENFELD:

Q This one starts with a quote. Dr. Cole, the zoning code states that non-inherent adverse effects are physical and operational characteristics not necessarily associated with the particular use, or adverse effects created by unusual characteristics of the site.

I'm going to ask you about several features of this special exception, and would you please explain whether or not, in your opinion, they constitute a non-inherent characteristic with respect to that characteristic's relationship to air quality under the EPA National Ambient Air Quality Standards? The first, is the gas station's location, immediately adjacent to a loading dock, an inherent or non-inherent characteristic in your opinion, and if so, why?

A Well, just --

MR. GOECKE: Objection. It's beyond the scope of

his expertise.

MR. GROSSMAN: Is he knowledgeable about gas stations in general so that he could answer questions about inherent and -- what's inherent and non-inherent?

MS. ROSENFELD: Well, I think we can ask Dr. Cole that question.

BY MS. ROSENFELD:

Q Dr. Cole, have you been familiar with the testimony in this case regarding the proximity of gas stations in general to loading docks?

A Is there testimony on the record on that issue? I was going to answer in the following way --

MR. GROSSMAN: Well, we have an objection. So you can't answer in the following way until we resolve the objection.

THE WITNESS: Okay.

MR. GROSSMAN: So the question, the question is, you're asking him what's inherent and non-inherent --

MS. ROSENFELD: That's correct.

MR. GROSSMAN: -- and unless he --

MS. ROSENFELD: With --

MR. GROSSMAN: -- with respect to gas station special exceptions. So he'd have to have some specialized knowledge of gas station special exceptions, it seems to me, to be able to answer that question as an expert, wouldn't

he?

MS. ROSENFELD: Well, it seems to me that what he would have to have is information about whether or not it's unique for a gas station to be located proximate to a loading dock. And I think the testimony both -- the testimony from the land use expert as well as from Costco itself is that this is unusual.

MR. GROSSMAN: The question is, in his expertise, is it inherent or non-inherent, and if you're telling me that he has some specialized knowledge in that area, that is, of gas stations and their inherent qualities, that might be something he could answer, but if --

MS. ROSENFELD: Well, I certainly think it's within his expertise, after having reviewed all of the scientific reports, to have an expert opinion as to the effect of the air emissions and the loading dock and whether or not that's a unique --

MR. GROSSMAN: I don't think that's within the expertise that he's proffered for. I don't think that --

THE WITNESS: I have a, I have a suggestion, Mr. Examiner.

MR. GROSSMAN: Hold on one second. Hold on one second. I don't think that's within the expertise that he's proffered for. I mean, it's certainly an arguable issue based on testimony regarding land use that's in the record,

but I don't know that he can testify as to something, whether something is inherent or non-inherent based on that. But I'll tell you what. You can think about it, you can all think about it overnight, and then tell me what you think in the morning. How's that?

MR. GOECKE: Thank you.

MS. ROSENFELD: Okay.

MS. HARRIS: Can we clarify two things, please? One is, is Mr. Silverman also going to be asking questions of Dr. Cole?

MR. SILVERMAN: I don't think so.

MS. ADELMAN: No.

MS. HARRIS: Okay. And then second of all, can we identify with certainty, the -- so the witnesses tomorrow are Mark --

MS. ROSENFELD: Mark Meszaros and possibly Ms. Adelman.

MS. HARRIS: Okay.

MR. GROSSMAN: I don't know how long the cross-examination is going to take. Do we need to line somebody else up as well, or is that --

MS. HARRIS: No, I think that's fine.

MR. GROSSMAN: Okay. All right. Anything else --

MS. ROSENFELD: Okay.

MR. GROSSMAN: -- before we say good night?

(No audible response.)

MR. GROSSMAN: All right. Thank you, sir.

MS. ROSENFELD: Thank you.

THE WITNESS: Thank you.

MR. GROSSMAN: Good night. We'll see you tomorrow morning.

MS. HARRIS: Good night.

MR. GOECKE: Good night. Thank you.

(Whereupon, at 4:48 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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