OFFICE OF ZONING AND ADMINISTRATIVE HEARINGS

FOR MONTGOMERY COUNTY

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

A hearing in the above-entitled matter was held on May 22, 2014, commencing at 9:44 a.m., at the Office of Zoning and Administrative Hearings, 100 Maryland Avenue, Rita Davidson Memorial Hearing Room, Rockville, Maryland 20850 before:

Robert 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 35th day of a public hearing in the matter of Costco Wholesale Corporation, Court of Appeals No. S-2863, OZAH No. 13-12, a petition for a special exception pursuant to Section 59G2.06 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 in Wheaton Plaza, Parcel 10, also known as Westfield Wheaton Mall. And it is zoned C-2, general commercial.

The hearing was begun on April 26, 2013, and the next session will be on May 29, 2014. There possibly will be one on June 6, 2014, 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 am taking evidence and I'll write a report and recommendation to the Board of Appeals which will make the decision in this case. Will the parties identify themselves, please?

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

MS. HARRIS: Good morning. Pat Harris for Costco.

MR. GOECKE: Good morning. Mike Goecke for Costco.

MS. ROSENFELD: Michele Rosenfeld for Kensington Heights.

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

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

MR. GROSSMAN: Good morning.

MS. DUCKETT: Eleanor Duckett, Kensington View.

MR. GROSSMAN: All right. I'm missing Mr. Sullivan. Looking in the background and on the witness stand already is Dr. Cole. All right. Let's -- a couple of preliminary matters.

One is, since our last session on May 20, the following additional exhibits have been filed. They're labeled as having been received at the hearing. They were actually proffered to me at the hearing, but I had to leave, so at the end of May 20, so these were then handed in in my office. It's Exhibit 596, comments of the American Lung Association on EPA's integrated science assessment for oxides and nitrogen health criteria; 597, received at the -- well, these were all received at the hearing, short-term exposure to air pollution and lung function at the Farmingham Park study; 598, nitrogen dioxide and mortality review and meta-analysis of long-term studies; 599, review of the primary NAA QS for nitrogen dioxide CASAC review. It

says nitrogen dioxide, but then it says NO1, I think, and NO2. 600 is review, repeated review of the integrated science assessment for oxides and nitrogen and other criteria first externally graphed, March 12-13, 2014; and then 601 was an email from Ms. Cordry clarifying her hearing statements on the budget approval date.

All right. The witness for today is Dr. Cole in sur rebuttal and hopefully our final planned day will be May 29, possibly June 6th. Did we resolve the question of additional witnesses, or did --

MR. GOECKE: We haven't spoken with Ms. Rosenfeld yet, but we are prepared to accept your offer that the, Dr. Jison and Dr. Bunn, or Dr. Chase will not testify about how the exchange for having exhibits submitted into, into the record. The one caveat which I have not communicated to Ms. Rosenfeld yet is we have a few, probably about five more articles that we would like to submit, and I'll show them to Ms. Rosenfeld before she agrees to this, obviously, but that would be just the one loose end in terms of resolving this.

MR. GROSSMAN: Okay. We don't want any loose ends.

MR. GOECKE: I don't, either.

MR. GROSSMAN: Okay. All right. And if we finish in time today, we'll discuss objections. I keep on having my, my staff lay out all the files that have the objected to

documents in them so we can go through them. But in any event, let's proceed. Any other preliminary or procedural matters?

MS. HARRIS: No, sir.

MR. GROSSMAN: Seeing none, all right. You may proceed, Ms. Rosenfeld. I take it you're calling Dr. Cole in his rebuttal, sur rebuttal capacity?

MS. ROSENFELD: That I am. Thank you.

MR. GROSSMAN: And, Dr. Cole, let me, well, from the first, state your full name for the record.

MR. COLE: Dr. Henry S. Cole.

MR. GROSSMAN: And, Dr. Cole, let me remind you that you're still under oath.

MR. COLE: Yes.

MR. GROSSMAN: Okay. You may proceed.

BY MS. ROSENFELD:

Q Good morning, Dr. Cole.

A Good morning.

Q And happy birthday.

A Thank you.

Q Have you reviewed Mr. Sullivan's February 2014 rebuttal report?

A Yes, I have.

Q And have you been present during the course of his testimony on the rebuttal report?

A Yes.

Q Are you aware of the fact that Mr. Sullivan has said that you testified that the ozone limiting method, quote, should be, end quote, used to determine a concentration one hour NO2 on the mall parcel?

A I'm aware he said that.

Q And do you agree with that characterization?

A No, not at all.

Q Okay.

A As a matter of fact, I cautioned against its use.

MR. GROSSMAN: Well, you know, the testimony itself speaks for itself. I have read it and so go ahead. He doesn't have to --

MS. ROSENFELD: I'm not spending a lot of time on this.

MR. GROSSMAN: Okay.

MS. ROSENFELD: We had Mr. Sullivan's view of those comments. I just wanted to offer for the record --

MR. GROSSMAN: I understand.

MS. ROSENFELD: -- Dr. Cole's.

BY MS. ROSENFELD:

Q In your review of the rebuttal report, is it your opinion now that Mr. Sullivan has performed the analysis necessary to justify the use of the ozone limiting method in achieving his new, lower NO2 emission levels on the mall

parcel?

A Well, I, I think it's, it's an appropriate tool, but I have, but one must meet many criteria and provide justifications for the way in which that tool is used. And in my, in my judgment he has neither provided the, the justification for many of the choices that he made. And in once case, the case of the so-called tail pipe box or 40 meter zone, he departs from the ozone limiting method in a substantial way by fixing the percentage and assuming that there is no ozone conversion in that zone from sources in that zone. In my judgment, that's a substantial departure from EPA's guidance. And so in, in the very zone where concentrations, NOX concentrations are highest, we don't get the benefit of the ozone reaction. And we'll get into that in further detail, I'm sure.

MR. GROSSMAN: You said we don't get the benefit. Now, what does that mean? You said we don't get the benefit of the ozone reaction. What does that mean, by the way?

THE WITNESS: It means that, it means that according to EPA's guidance, and according to my use of this model and my development of this model, there's no exclusionary zone where the ozone reaction with nitric oxide doesn't take place. In other words, there's no assumption that there's a zone where there's no chemical reaction between NO and ozone. And in the way that he treats this,

there is no ozone reaction.
MR. GROSSMAN: Let me get to the heart of that for a second. Mr. Sullivan testified, it was my understanding of his testimony, that he said that for the conversion to take place from NO to NO2, it has to be, there has to be contact at a molecular level with ozone and there has to be, there's a time element involved and that within the box that there isn't that time for that to occur. Now, regardless of what you say is the approved method, is he scientifically incorrect?
THE WITNESS: I believe he is.
MR. GROSSMAN: Okay. All right. Thank you.
THE WITNESS: And I will present further evidence.
BY MS. ROSENFELD:
Q In September of 2012, you met with Mr. Sullivan and his employee, Mr. Hlinka to discuss modeling issues with the aim of identifying areas of agreement and disagreement on modeling, is that correct?
A That is.
Q And was the ozone limiting method discussed at this meeting?
A Not to my recollection.
Q Are you familiar with Mr. Sullivan's modeling protocol document for November of 2012?
A Yes, I am.

Q And did that protocol generally reflect the modeling issues that you and Mr. Sullivan had discussed?
A Yes.
Q And you and Mr. Sullivan, did you reach agreement on certain matters and agree to disagree on others?
A That's the case, yes.
Q And are you familiar with Mr. Sullivan's November 2012 and August 2013 reports?
A Yes.
Q And was the ozone limiting method applied in either of those reports?
A No.
Q Turning generally to some overriding principles of EPA guidance, are you familiar with EPA guidance on how modelers should estimate one hour NO2 concentrations?
A Yes, I am.
Q And in your opinion what are the governing EPA documents for modeling one hour NO2?
A Okay. Well, there's quite a bit of guidance in Appendix W of the modeling guideline. And secondly, there are two memorandum that came out of EPA; first in, I think it was June of 2010 by a Mr. Fox, who was the head of the modeling section there. And the second was a further enhancement and clarification with some additions in March 2011, by the same Mr. Fox.

MS. ROSENFELD: And for the record, Mr. Grossman, Appendix W is Exhibit 285, the March 2011 memorandum is Exhibit 407, and the 2010 memorandum is Exhibit 391(a). And I know you're familiar with them because we've talked about them in some length already in this case.
MR. GROSSMAN: I am. They're burned into my mind.
BY MS. ROSENFELD:
Q When -- Dr. Cole, when the third, when the second memorandum from Mr. Fox, the March 2011 memorandum was issued, did that memorandum rescind or retract the earlier 2010 memo?
A No. I would characterize it as clarification with some changes, some improvements.
Q In your opinion, what is the purpose of EPA's guidance as reflected in Appendix W and the 2010 and 2011 guidance memos, in particular with respect to NO2?
A Well, I think that can be addressed by my giving you an excerpt from Appendix W. It's page 68230.
MR. GROSSMAN: I'm sorry, which page?
THE WITNESS: 68230.
MR. GROSSMAN: Okay.
THE WITNESS: And I think this quote gets to the heart of the purpose of the guidance. In all cases, the model applied to a given situation should be the one that provides the most accurate representation of atmospheric

transport, dispersion, and chemical transformations in the area of interest. However, to ensure consistency, deviations from this guide should be carefully documented and fully supported.
BY MS. ROSENFELD:
Q That reference that you just quoted talks about atmospheric transport. Does atmospheric transport play a role in this case?
A Now, by transport, we're talking about the transport of emissions, let's say, or pollutants with the average wind speed. So, it's the flow that dictates where the pollutants will go.
Q And it also talks about dispersion, the most accurate representation of dispersion. Does dispersion play a role in this particular case?
A Yes. Dispersion comes from turbulence in the atmosphere, turbulence of different scales. At the surface there are obstacles. The wind flows over the obstacles and that imparts swirls and whirls and changes of direction and changes of speed. And you can think of dispersion as putting some chocolate in the bottom of a glass of milk and mixing it up; so the more turbulence there is, the faster the mixing and voila, you have a uniform chocolate milk at some point.
MR. GROSSMAN: What if your martini is shaken, not

stirred?
THE WITNESS: Same principle, but the ice in the martini or the olive may further enhance the turbulence.
MR. GROSSMAN: Okay. You posed that.
BY MS. ROSENFELD:
Q The guidance for the EPA that you referenced a moment ago also talks about chemical transformations in the area of interest. Are there chemical transformations at issue here?
A Yes, there are. The most important one is the reaction between ozone and the NO, and the product of that reaction as a criteria pollutant is nitrogen dioxide, or NO2. So, that's the most important. There are other reactions as well, but that would be the dominant chemical reaction that affects the emissions in this particular case.
Q And in prior reports, the reports that pre-date the rebuttal report, has Mr. Sullivan considered chemical transformations as part of his model and assessment?
A The first time that comes up is in the rebuttal report. It was not part of either the November, December, or January 2013. It was not part of the August 2013 modeling.
Q And so how is it different, for example, from his modeling of PM2.5 or some of the other pollutants that he, he has modeled?

A Well, I think the guidance is clear that for something like carbon monoxide or PM2.5, the modeling -- even though those things do react in the atmosphere, the modeling guidance doesn't address that. So, it's the NO that is very reactive, particularly with ozone, and that's why that chemistry is considered, for example, in the ozone limiting method or other kinds of models that include chemistry.
Q So those other chemicals didn't -- the modeling didn't rely on chemical conversion? We'd simply be looking at the chemical isolation, correct?
A You're talking about the modeling applications prior to the rebuttal report?
Q Yes, correct.
A That is correct.
Q How does EPA guidance instruct modelers to address the conversion of NOX to NO2? Is there a hierarchy?
A Yes, there is. There are three tiers that EPA mentions. The first is total conversion, which is the most conservative method. And this assumes that all of the NOX that's emitted into the atmosphere becomes NO2 from start to go. Second is a retreat from that conservatism, which is the 80 percent conversion default that they give if you want to take a step back from the tier one. So, tier two you allow for the conversion and you assume that 80 percent of

what's emitted in terms of the oxide nitrogen becomes NO2, which is the criteria pollutant of concern.
The third tier is, includes the ozone limiting method and a second model called the plume molecular volume. I'm not going to get it right, it's the PM -- it doesn't matter, because Mr. Sullivan did not choose to use that. So we have the ozone limiting method as tier, tier three, which Mr. Sullivan applied, although I have serious questions about the method that was used. He did apply that in the rebuttal report.
Q And can you review generally how the ozone limiting method works?
A Sure. Basically, you have two pollutants that have to interact; and one is NO and the other is ozone. If there's a lot more ozone than there is oxides of nitrogen or NO, then the ozone -- let me get this right. If, if there's more NOX than there is ozone, then the ozone limits the amount of NO that can convert to NO2. If there's a lot of ozone, more than the NO, then the NO, all of the NO can convert to NO2. That's the basic assumption of the ozone limiting method.
MR. GROSSMAN: I take it that the reason for this is that you have to have an available oxygen molecule to, to combine with the NO?
THE WITNESS: That's exactly right. And the ozone

is, is a more reactive form of oxygen, has that extra oxygen and the NO is a convenient place for the electrons to commingle.
MR. GROSSMAN: I understand.
BY MS. ROSENFELD:
Q And then in addition to the NO2 that is, that becomes converted in the presence of the ozone, is there also other NO2 present in vehicular emissions?
A Yes, there is. There's what is called in-stack NO2, which is actually formed in the hot exhausts of a stack. In the case of a power plant, it would be a great, big stack. In the case of a car exhaust, it's really, I would call it the tailpipe NO2, or you could call it the primary NO2, it's been called. But it comes right out of the stack, so it doesn't require the ozone reaction to have that NO2 present. So you've got two things which are contributing to the NO2. First, is the in-stack and secondly is whatever remaining NO is converted by ozone.
Q And in the rebuttal report, there is a, what we refer to as stage one --
A Yes.
Q -- as I understand it came directly from the August 2012 report?
A That's my understanding, yes.
Q Set that aside for a moment. Have you reviewed

the analysis, other report, that's labeled stage two and stage three of the rebuttal report?
A Yes, I have.
Q And in your opinion, did these methods fall under the ozone limiting method or other recognized EPA methodologies?
A Well, let me start with stage three. Stage three is not, and Mr. Sullivan has acknowledged, stage three is not the ozone limiting method, is not a method that is included in the EPA's guidance. Stage three simply assigns arbitrarily two ratios beyond the inbox. It's a 50 percent ratio and within, within the close-in box, the 40 meters zone beyond the queue and loading dock, it is a 25 percent and that is not something that's mentioned in the guidance. If you want to go to constant percentages, the guidance talks about 80 percent conversion --
Q And --
A -- in the whole modeling domain.
Q And so under EPA guidance then, 80 percent conversion factor would apply both within the tailpipe box --
A Yes.
Q -- and outside of the tailpipe box equally?
A I believe that's correct.
Q Okay. And in your opinion, is the stage two

analysis, does that qualify as the ozone limiting method?
A Let's put it this way, it kind of squeaks in by the skin of its teeth. I have serious, as I said before, serious problems with assigning an arbitrary 25 percent NO2 to NOX conversion ratio in the, in this 40 meter close-in zone. One might say from the evidence that perhaps, although there have been higher primary or in-stack ratio observed in certain studies that go up to 30 percent, I don't think there's any basis in this particular case for excluding ozone conversion of NO to NO2 in that close-in zone, and certainly not something that's mentioned in the guidance.
Q So you didn't find anything in the, in Appendix W or the 2010 or 2011 EPA guidance memos that precludes that conversion factor within that 40 meter radius?
A That's my understanding, yes.
Q So in your view, is this a novel approach to the OLM analysis?
MR. GOECKE: Objection. Leading.
MR. GROSSMAN: I'll sustain that.
BY MS. ROSENFELD:
Q Would you elaborate on your analysis of the stage two analysis? Are there other issues, are there other areas in which you think that the stage two analysis deviates from EPA guidance?

A Okay. So we started with the exclusion zone, that was number one. Number two, I think perhaps the most important is the hour-by-hour matching background NO2 concentrations. Now that's mentioned in the EPA's 2011, March 2011 guidance, but in my opinion those criteria have not been met in the rebuttal report. And we can get into that later, but do you want a, if you want a laundry list, I can add a few more things at this point, unless you want to --
Q In your opinion is there a correlation between elevated power plant plume observations and tailpipe emissions?
A Okay. That's an important question, because the data which Mr. Sullivan relies on to show that the mixing down to the molecular level happens at great distances, perhaps a kilometer away or a thousand meters away, that, the studies that he reference are for Powerpoint plumes. And it is absolutely inappropriate to use those, that information from, taken from power plants --
MR. GROSSMAN: You said Powerpoint. I think you meant power plants?
THE WITNESS: Right. Power plants.
MR. GROSSMAN: Power plant plumes?
THE WITNESS: Power plant, thank you. Thank you. I see you're being kind to me on this day of my --

MR. GROSSMAN: I always try to be kind. Occasionally I get grumpy, but all right.
THE WITNESS: All right. So what happens at the surface of the earth is very different from what happens several hundred meters aloft and I can get into that in greater detail and show some slides which distinguish conditions at the surface and conditions aloft.
MS. ROSENFELD: Did you previously, sir --
THE WITNESS: But the, in short, there's a lot more small-scale turbulent mixing at the surface due to surface roughness elements than there is aloft where you don't have a surface.
BY MS. ROSENFELD:
Q In your opinion, is the ozone limiting method a non-regulatory method?
A It is. It's described in the --
MR. GOECKE: Objection, leading.
MR. GROSSMAN: Yes. I'm not, well, I'm going to allow the question because I think there's enough of an evidentiary base to get to that, that question that way.
THE WITNESS: So the guidance for March 2011, guidance on NO2 modeling clearly labels this as a non-regulatory model and I believe that adds to the many cautions and requirements contained in the guidance for its use.
MR. GROSSMAN: When you say non-regulatory method,

what do you mean by that?
THE WITNESS: Like air mod, which Mr. Sullivan used for his modeling and I have no argument at all, I think that's, that is specifically described in Appendix W. It's, it's an official, it's been validated over many, many years. It's been improved. It's been refined. It's basically the state-of-the-art in terms of the model that's used for many different kinds of sources. So it has a status which the ozone limiting method does not. So there's, in my judgment, anything that's a non-regulatory model requires adherence to greater scrutiny and greater conservatism.
MR. GROSSMAN: Well, whatever you think about the methodology -- I'm concerned with the use of the term non-regulatory because you've already testified that that particular method is mentioned in Appendix W and in the two subsequent memos from Mr. Fox interpreting it. So how could it be non-regulatory?
THE WITNESS: Well, you'll have to ask EPA because that's a term that I'm quoting directly from the guidance. I'm giving you my interpretation, having worked in the modeling office at EPA, of why they would call that a non-regulatory model.
MR. GROSSMAN: So can you just give me a reference in --
THE WITNESS: Yes.

MR. GROSSMAN: -- any of those regulations --
THE WITNESS: Certainly.
MR. GROSSMAN: -- as to where the OLM method is called non-regulatory? I'm not sure the labeling of it makes the big difference, but I'm, I am curious.
THE WITNESS: Okay. It's going to take me a second to --
MR. GROSSMAN: Sure. Take your time.
THE WITNESS: -- take it out. Okay. On page 5 of, of the, of the March, the Fox memo from March 1, 2011, Tyler Fox, it specifically says the June 29, 2010 memo highlighted some of the potential issues that may need to be addressed in the application of these less conservative assumptions for estimating NO2 impacts relative to the tier 1 option of full conversion and clarify the status of the PVMRM and the OLM approaches available as non-regulatory default options within the air model. So it's, that's where I'm getting the term non-regulatory.
MR. GROSSMAN: Non-regulatory default options?
THE WITNESS: Yes. That would be the first --
MR. GROSSMAN: Okay.
MS. ROSENFELD: And, Dr. Cole, did you say that was on page 5?
MR. GROSSMAN: That's, I think the bottom --
THE WITNESS: It's the, where it says approval and

application. It's the --
MS. ROSENFELD: Got it.
THE WITNESS: -- that first paragraph, the last sentence.
MR. GROSSMAN: The last sentence. Okay.
BY MS. ROSENFELD:
Q And, Dr. Cole, on page 6 of that same Exhibit 407, under tier 3 options for NO to NO2 conversion, does this memo further reference or categorize the OLM method?
MR. GOECKE: I'm sorry?
THE WITNESS: Yes, that's basically --
MS. ROSENFELD: Page 6, under the heading deal 3 options.
THE WITNESS: It says also since OLM and PVMRM methods are currently implemented as non-regulatory default options within the AERMOD dispersions model, the use requires justification and approval by the regional office on a case-by-case basis pursuant to Sections 3.1.2.C, et cetera, et cetera of Appendix W.
MR. GROSSMAN: I guess I, you termed it, I think, a non-regulatory model. It's a non-regulatory option of the accepted model, is that, is that a fair --
THE WITNESS: Not being an attorney, I'll accept, you can correct my description relative to the text here.
MR. GROSSMAN: I'm just going by what Exhibit 4

has --
THE WITNESS: Okay.
BY MS. ROSENFELD:
Q And, Dr. Cole, under these non-regulatory default options, are there default inputs that the EPA guidance recommends when using --
A Yes.
Q -- the OLM method?
A Yes, there are.
Q Okay. And does the EPA have a default conversion ratio for NO2, NOX under the ozone limiting method?
A A default method?
MR. GROSSMAN: Default conversion ratio.
BY MS. ROSENFELD:
Q A default conversion?
A It really does not. It looks at the ozone and the NO in the atmosphere. There are other, let me just add there are other qualifications that dictate or that at least recommend how something should be done that could be considered as default options. But in terms of the basics, it's, you know, it's the ozone limiting method, which I described earlier.
Q You previously served a scientist and section chief with the EPA's Air Quality Modeling Group, is that correct?

A That's correct.
Q In your opinion, should the Board of Appeals require the applicants to follow the EPA guidance and, if so, why?
MR. GOECKE: Objection.
MR. GROSSMAN: I'm going to sustain that objection. He has no basis for a legal advice to the Board of Appeals.
THE WITNESS: Mr. Grossman, could I --
MR. GROSSMAN: No, there's no question pending.
THE WITNESS: Okay.
BY MS. ROSENFELD:
Q In your opinion, has Mr. Sullivan -- earlier you were, you quoted from page 68230 of Appendix W and the second sentence that you read was, however, to ensure consistency, deviations from this guide, meaning Appendix W, should be carefully documented and fully supported. In your opinion, has Mr. Sullivan satisfied the requirement that deviations from EPA guidance be carefully documented and fully supported in his rebuttal report?
A My judgment is that he has not met that criteria.
Q And do you have an overview or some general observations to support that opinion?
A I do. One of the difficulties in looking at the rebuttal report, for example, is that it builds, there's

been a sequence of reports with many different revisions and that makes it difficult to follow exactly what's going on.
Secondly, all of the changes or most of the changes have reduced the conservatism of the modeling. Now, I'd like to read a quote from the March 2011 guidance that gets to the heart of this. It's on page --
MR. GROSSMAN: This is Exhibit 407?
THE WITNESS: Mr. Hearing Examiner --
MR. GROSSMAN: Yes?
THE WITNESS: -- can I suggest a break and I will have that for you? I also need a health-related break.
MR. GROSSMAN: All right. A health-related break, so, all right. We'll take a five minute break.
THE WITNESS: Thank you.
(Whereupon, at 10:26 a.m., a brief recess was taken.)
MR. GROSSMAN: All right. We're back on the record. Okay.
THE WITNESS: Before the break –
MR. GROSSMAN: Yes.
THE WITNESS: I said there was a quote that I would like to read which addresses the issues which I mentioned, the progressive retreat from conservatism. So here is the quote. It's on page 12 --
MR. GROSSMAN: Okay.

THE WITNESS: -- under determining background concentrations.
MS. ROSENFELD: I'm sorry, which document?
MR. GROSSMAN: Exhibit 407 I think he's saying, the March 1, 2011 memo.
THE WITNESS: It says the goal of the cumulative impact assessment should be to demonstrate with an adequate degree of confidence in the result that the proposed new or modified emissions will not cause or significantly contribute to violations of the NAAQS, the National Ambient Air Quality Standards. In general, the more conservative the assumptions on which the cumulative analysis is based, the more confidence there will be that the goal has been achieved and the less controversial the review process will be from the perspective of the reviewing authority.
As less conservative assumptions are implemented in the analysis, the more scrutiny those assumptions may require. And the review process may tend to be lengthier and more controversial as a result. We expect that by providing a more detailed discussion of the factors to be considered in the cumulative assessment, permit applicants and permitting authorities will be able to find the proper balance of competing factors that contribute to this analysis.
I think the situation that I mentioned where we

have every, with every successive report that Mr. Sullivan has issued, he finds it necessary to go to more and more conservative or less and less conservative analyses, such as retreating from total conversion is stage one, or the work from November or he, he has in his stage 3, for example, he uses a non-regulatory approach which he says is more refined but, in fact, is more conservative and produces lower concentrations. So this progressive retreat from conservatism, particularly in a complex situation like this one where there's so many variables that individually and interactively contain a great deal of complexity, there's a strong need for conservatism. And in my judgment, this is why EPA has stated that you use these more conservative methods unless you can document and justify and explain that your modeling application can deal with all of the complexities.
BY MS. ROSENFELD:
Q Dr. Cole, I think you said stage 3 uses, is a more conservative approach?
A Did I say that?
Q Is that what you meant?
A No. It's by far less conservative because it assumes, it puts caps basically on the ozone concentrations and the NO2 to NOX conversion factors both in the near, the near box or the close-in box and beyond. So stage 3, which

is not, there's nothing like it in these regulations and it produces lower concentrations and it's less conservative.

MR. GROSSMAN: Looking at the quotes that you've given us since you began to testify --

THE WITNESS: Yes.

MR. GROSSMAN: -- on sur-rebuttal, I mean is it fair to say that there's kind of a tension in between, in the regulations, between the touchstone goal of accuracy and the need for conservatism to reduce uncertainty in the results?

THE WITNESS: Yes.

MR. GROSSMAN: Because I, I see one of the quotes you gave us from Appendix W, Exhibit 285, page 68230 that you started out, it starts out, subsection (d), the model that most accurately estimates concentrations in the area of interest is always sought. So that's clearly a touchstone goal of the exercise and then they go on to say the problem, the need, there's a need for consistency, but then they add on another pro viso that says, at the end of that paragraph, such consistency is not, however, promoted at the expense of model and database accuracy. So they return to the accuracies and then you have the other quotes that you quoted which call for more conservatism to the extent that you, you have this less typical options.

So I'm trying to balance that all to get a sense

of what is actually being required here. So is that a fair way to, to look at it, what I've just said?

THE WITNESS: Well, if you go beyond that particular statement and look at the, for example, the other excerpts that I read from the applicable guidance, it's a one-hour NO2. I think the guidance both recognizes the huge amount of uncertainty, talks about it. Appendix W talks about the many sources of uncertainty and the errors that you can expect.

MR. GROSSMAN: Right.

THE WITNESS: In terms of accuracy, you never really know what's accurate. You can -- in terms of model, you can look at a bunch of models and see how well they evaluate against monitors if you have a good array of monitors. We did that in EPA when I was there. We – so, accurate in this particular case is very hard to define because of all of the uncertainties. You'd have to have a huge error band about what you call your answer because the more uncertainties there are, the greater is that error band.

Now in my opinion, what this guidance says is that when the issue is compliance with the standard and protection of human health, that you look at the error band, the upper error band, that's where the conservatism comes from, because with so many uncertainties you've got to be

more cautious. That's what they're saying. That's the gist of this regulation.

MR. GROSSMAN: I understand. I'm just trying to get a handle on what seems to be somewhat a balancing effort in the, in the language, combining the language from Appendix W that you referenced and the language from Exhibit 407, the March 2011 memorandum because they seem to say, I mean it seems, appears clear to me in Appendix W that the, what they're seeking is accuracy, but they're recognizing that you can have variations from accuracy based on, on what tools you apply and all the circumstances. So it is kind of a, there's a tension between those two concepts. The more conservative you are in that sense, that is, the wider you, you spread out the potential results, the less close to accurate perhaps you may be, but you give yourself a bigger margin for safety. So isn't that, isn't that a fair way to look at it?

THE WITNESS: Yes, but there's, there's a presumption and a premise in what you said. The premise, the premise is that you, that you've used the most appropriate model, the most appropriate assumptions --

MR. GROSSMAN: Right.

THE WITNESS: -- that go into the model and the most appropriate sets of data that you need.

MR. GROSSMAN: Right. But they --

THE WITNESS: So if you don't, if you, if you define accuracy as a lower number, then perhaps you're getting further away from it. But if you define accuracy as that idyllic thing that comes down from, from above, which is the truth, accurate can only mean how good are the tools that you used. How good is, representative is the data that you used?

MR. GROSSMAN: Right. And, but you use the term appropriate tools and that, that's a question, what's appropriate in the circumstance is a question of scientific opinion, right?

THE WITNESS: Yes. And that's, a lot of that appropriate is embedded in these regulations they give you. Three, EPA gives you three tiers.

MR. GROSSMAN: Right. Okay. Thank you.

BY MS. ROSENFELD:

Q And, Dr. Cole, in the case of, of the stage 2 and the stage 3 analysis that's provided in Mr. Sullivan's rebuttal report, both of those would be in permit setting, would require EPA approval, is that correct?

A Well, there are two -- if this were a permit application, Mr. Sullivan has testified this isn't a permit application. But if it were a permit application, yes, it would require approval.

MR. GROSSMAN: Excuse me. Mr. Brann, can you

check and see if our thermostat has been turned off again?
MR. BRANN: Yes.
THE WITNESS: Is it accurate or is it conservative?
MR. GROSSMAN: I think it's so conservative they turn it off when we're not looking. So you turned it back to on?
MR. BRANN: It was on, it was just --
MR. GROSSMAN: Oh. All right.
MR. BRANN: -- turned down a few degrees.
MR. GROSSMAN: Thank you. You may resume.
BY MS. ROSENFELD:
Q And during the course of that case by case approval, there would be regulatory review of any of the non-default inputs that would be selected, is that correct?
A Yes, that's -- the greater the, the more departures from defaults are from recommended methods and values, the more scrutiny there would be. That's what the, that was reflected in the quote --
MR. GOECKE: I object, Mr. Grossman. There's no foundation that he's been through the air permitting classes or that he's familiar with what it requires.
MR. GROSSMAN: Well, first of all, actually I see a different problem with the question. The question said non-default. It actually said it's a non-regulatory default

that is, that doesn't make it a non-default. So I think those are two different things. So I think the --
MS. ROSENFELD: The non-regulatory default method.
MR. GROSSMAN: So, all right. So let's -- state your question again so we make sure we have -- and then we'll look at the objection after this one.
BY MS. ROSENFELD:
Q Recognizing that we are not in an EPA permit review process, if we were in a non -- in a, in an EPA permit review process and Mr. Sullivan selected a non-regulatory default method, would deviations from EPA guidance be reviewed and approved or not approved by the EPA regulators?
MR. GOECKE: Same objection. It's a speculation. My recollection of his testimony during voir dire was that he had not ever gone through the process of obtaining an air permit and that -- therefore, he has no foundation to testify about what EPA would or would not do. And even if he has, it would be speculative as to what they would require.
MR. GROSSMAN: I'm going to overrule that objection. He served in the capacity of reviewing models submitted while he was with the EPA and I think this is certainly within the ambit that he can testify. The question of whether or not it's entirely relevant here

because it's not an EPA permit process is something else, but I think it's within the broad ambit of what we've looked at here. So I'll overrule the objection.
MR. GOECKE: But, Mr. Grossman, his experience was more than three decades ago. What they do today is, is, could be light years different than what they did --
MR. GROSSMAN: It could be and I, and --
MR. GOECKE: -- back in the '70's.
MR. GROSSMAN: -- you can cross-examine him on that point if you wish to, but I'm going to overrule the objection.
MR. GOECKE: Thank you.
THE WITNESS: Can you restate your question please?
MR. GROSSMAN: Not restate it, but repeat it.
BY MS. ROSENFELD:
Q In its, in its regulatory capacity, as EPA reviews these non-regulatory default methodologies, does the EPA have the authority to approve or reject non-default inputs into the modeling assumptions?
MR. GROSSMAN: Non-regulatory default?
MS. ROSENFELD: Non-regulatory default.
THE WITNESS: Well, my judgment is the wording is clear that they can review, the fact that they have to review and then approve would mean that they may say, sorry,

go back to the drawing board.
BY MS. ROSENFELD:
Q And would that, could that review include selection of monitors?
MR. GOECKE: Same objection, speculative.
MR. GROSSMAN: I'm going to overrule once again. I think that's within the ambit of what his knowledge is of the EPA --
THE WITNESS: Okay.
MR. GROSSMAN: -- which you can address on cross-examination.
THE WITNESS: I'm going to talk about an experience that I had.
MR. GROSSMAN: No, let's answer the question directly. Don't talk about your experience.
THE WITNESS: Okay.
BY MS. ROSENFELD:
Q Would such regulatory review include something like the selection of the monitors you used?
A It could.
MR. GROSSMAN: You mean monitors for background --
MS. ROSENFELD: For background.
MR. GROSSMAN: -- as opposed to --
THE WITNESS: Yes.
MR. GROSSMAN: -- receptors? Okay.

MS. ROSENFELD: Yes.
THE WITNESS: Yes, and that's an issue in the guidance.
MS. ROSENFELD: And --
THE WITNESS: And that's an issue that comes up here and they certainly could say, well, we don't like the way you did it, please do it another way.
MS. ROSENFELD: And --
MR. GROSSMAN: Did it, meaning did the selection of the monitors?
THE WITNESS: Put the, yes, select the monitors in a different way or treat the data in a different way.
MR. GROSSMAN: Okay.
THE WITNESS: Don't use paired hour-by-hour analyses. They could say a number of things, absolutely.
BY MS. ROSENFELD:
Q Could it include the selection of an urban versus rural dispersion coefficients?
A It could.
Q Could it include such things as the selection of meteorological data used, the selection of meteorological data?
A Yes, it certainly could.
Q In your opinion, is a strict adherence to the EPA guidelines necessary in this case?

MR. GROSSMAN: I don't know what that means. That's, once again, necessary in a legal sense, necessary to achieve accuracy? What do you mean by necessary?
BY MS. ROSENFELD:
Q In your opinion, is strict adherence to guidelines necessary in this case to achieve accuracy in the modeling results?
A Let me put it this, this way. There are so many choices that are involved in modeling. You mentioned a few of them. And so the greater the adherence to recommended values and conservative choices, the greater confidence a regulator or a decider or Dr. Cole or anybody would have in the results. And the more uncertainty there is, the more that you want to adhere to default guidance and I think that's embedded in the regulations that we've cited in the Fox, two Fox memos and certainly in Appendix W.
And I want to say that having been at EPA and having followed many air quality issues and modeling issues since, that they have worked for decades. What you see in these regulations and in these memos is based on a great deal of work. Model evaluation studies, panels with many different kinds of scientists, chemists, meteorologists, et cetera, people who understand technology. So they, they come up, what they come up with, which is continually being refined over decades, the aim is to get it better and better

to get closer to that accuracy point that you're talking about. So I know that they've been working on that for a long time, so I would say what's in this guidance, even if it's not required strictly on a regulatory basis for a permit application is extremely valuable to any decision maker because it's this wealth of experience.
I was, I was a part of it for, you know, five or six years and I understand the machinations that they have to go through with many different kinds of parties, tasks, stakeholders involved. So what they come up with is pretty solid and their goal, as I said, is always to assure that something new in a case like this will meet the standards of compliance and, secondly, protect human health. So I would say that this is a valuable set of guidance for decision makers in this particular case, even if not strictly required from a regulatory standpoint.
Q And you've testified that modeling contains many uncertainties.
A Right.
Q How does EPA's guidance handle the issue of uncertainty?
A Well, if you look at Section 9.1.1 of Appendix W, they have a very good discussion of the sources of uncertainty. So, number one, they imply that even if you had a model, a perfect model, there'd still be many

uncertainties. So they're basically saying we know that modeling is an art as much as a science.
MR. GROSSMAN: I'm sorry, what page are you looking at?
THE WITNESS: Okay. This is Section 9.1.1 and Appendix W. If you would like a page, I can find you -- what is on page 68246.
MR. GROSSMAN: Okay. I've got it. Yeah.
THE WITNESS: So, number one, models are not perfect. The choice of model is an important choice which itself may or may not be the best choice. It may involved uncertainty. Then there, within every model such as AERMOD, or the ozone limiting method, there are choices that one makes and they're based on judgment. For example, urban versus rural dispersion coefficients, surface roughness, how topography, how, how topography in the area may affect concentrations and how do you model that. There are choices.
There are also uncertainties associated with what's measured, whether it's ozone, background, whether it's NO2 background, whether it's the emissions model that you've used, the emissions that you -- let me back up, because the choice of emissions model is a model choice. But once you choose an emissions model, there are many variables and the extent to which you're uncertain adds

uncertainty.
MR. GROSSMAN: By emission model, you mean like moves versus mobile --
THE WITNESS: Yes. So not only is there an issue of choice of model, but there is an issue of what parameters you put into the model for measurements, are they representative? Are they the best set of measurements? So there are, in outlines those, basically those three kinds of uncertainty.
BY MS. ROSENFELD:
Q In your opinion, are there examples of uncertainty in Mr. Sullivan's rebuttal report?
A Yes.
Q And could you highlight those?
A Yes. If we look at stage three to start with, he arbitrarily caps the NO2 to NOX ratio at .5, says that's the most you'll get from ozone limiting. So that would certainly be, is that right or not, the source of uncertainty. Is it based on measurements at the site? Since it's not, that's a source of uncertainty.
MR. GROSSMAN: Do you disagree with that particular judgment in this case, the .5 cap?
THE WITNESS: Yes, sir.
MR. GROSSMAN: Okay.
THE WITNESS: Well, I disagree with it because it

doesn't allow the atmosphere to do what it does. In other words, you may have higher. He hasn't presented any evidence to show that the level doesn't get higher.
MR. GROSSMAN: Okay. You may continue.
BY MS. ROSENFELD:
Q And do you have other examples of uncertainty?
A Another uncertainty would be the cap in the close end box of .25 and the fact that your, he's not allowing ozone conversion for the sources in the box, such as the queue. And I think that's an arbitrary choice, one that's not mentioned in the guidance and that would certainly add a level of uncertainty to the results. Also is the choice of your background monitors and the way that you handle NO2 background. Are you going to use the more conservative method of the 98th percentile averaged over several years or are you going to do the hour by hour match-up which Mr. Sullivan used, which introduces a great deal of uncertainty to the analysis.
MS. ROBESON: That's pared hourly?
THE WITNESS: Yes, the pared hourly where he takes Arlington data, the NO2 and matches on an hour-by-hour his model output for the receptors. EPA guidance has a great deal of caution and concern about that particular choice.
MR. GROSSMAN: Can you reference the particular regulation or what page --

THE WITNESS: Yes.
MR. GROSSMAN: -- criticizes on the --
THE WITNESS: Page 21 of Exhibit 407.
MR. GROSSMAN: And which particular paragraph are you referring to?
THE WITNESS: It is the middle paragraph or the second paragraph.
MR. GROSSMAN: Beginning in since several applications?
THE WITNESS: Yeah.
MR. GROSSMAN: Okay.
THE WITNESS: I can read that at this point, if you would like.
MR. GROSSMAN: Hold on a second. I'll leave that to counsel if you want to read that portion of that paragraph.
MS. ROSENFELD: Yes.
BY MS. ROSENFELD:
Q Dr. Cole, if you would, please?
A Since several applications have come to our attention proposing to combine monitored background and model concentrations on an hour-by-hour basis using hourly monitored background data corrected concurrently with the meteorological data period being processed by the model, we feel compelled to include a discussion of the potential

merits and concerns regarding such an approach. On the surface, this approach could be perceived as being more refined, a more refined method than what is recommended above and, therefore, more appropriate. However, the implicit assumption underlying this approach is that the background monitor levels for each hour are spatially uniform and that monitored values are fully representative of the background levels at each receptor for each hour. Such an assumption clearly ignores the many factors that contribute to temporal and spatial variability of ambient concentrations across a typical modeling domain on an hourly basis. Therefore, we do not recommend such an approach except in rare cases of relatively isolated sources where the available monitor can be shown to be representative of the ambient concentration levels in the areas of maximum impact from the proposed new source.
MR. GROSSMAN: Okay.
BY MS. ROSENFELD:
Q And, Dr. Cole, I believe we're going to get into this in more detail, but while we're on this section, in your opinion, does the site, the out parcel site, fall within the parameters that you just read? The parameters of those relatively, those rare cases of isolated sources?
A Okay. They're -- it does give some further guidance on the criteria necessary to justify hour-by-hour

pairing that in my judgment, Mr. Sullivan has not come near to meeting those criteria. The, there are a couple of issues embedded in this. One is, is a site on the other side of Washington metropolitan area, some 12 miles distance --

MR. GROSSMAN: You're talking about Arlington as a model?

THE WITNESS: Arlington site. Is it representative? And further, is it representative on an hour-by-hour basis? That's a pretty hard burden of proof. Secondly, it, this clearly talks about, looking at isolated cases, an isolated case might be a power plant in the middle of a prairie. This is not a power plant in the middle of a prairie. This is a major new source in a, an area that varies from suburban to urban with many sources. And not all of those sources are included in the modeling grid. They're not modeled and may have an impact.

Now there's another, another point -- well, ask another question.

BY MS. ROSENFELD:

Q We were talking about uncertainties. Do meteorological factors also count as an uncertainty, in your opinion?

A Well, let me build on this. Yes, meteorological, you have to ensure that the meteorology is representative of

the site. And modeling guidances, I don't have an argument with Mr. Sullivan's picking National Airport. Notice I didn't say Reagan National.

MR. GROSSMAN: Well, you don't know what you're talking about.

THE WITNESS: It's my birthday. I get a bye. So, okay, so he chooses Washington, but he's getting his background data for NO2 from Arlington. He's getting his ozone data from Rockville and sometimes from Beltsville, all right? And he's looking at emissions and modeling the conditions in Wheaton. So you're trying to -- I'm not saying that you can't do something like that. What I am saying is that the level of uncertainty that that creates, how do you, particularly on an hour-by-hour match-up is a lot to expect that you're coming near to accurate.

MR. GROSSMAN: Well, since you've touched on the choice of monitoring sites, do you have an opinion as to which would be the most representative monitoring site to choose?

THE WITNESS: Well, my criteria would be to pick sites that are closer, number one, like on the same side of the Metro area. Number two, that when you look at them, let's say from Google, Google Earth viewpoint, that they're not terribly different or look about the same mix of urban, suburban parkland, et cetera. That as the Wheaton,

Westfield Wheaton site.

MR. GROSSMAN: So that's, that, you call that most representative, in other words?

THE WITNESS: I would, yes. You're attempting to bring something in that, monitors that are representative.

MR. GROSSMAN: Is it more important to be representative than to be closer?

THE WITNESS: I believe that the two are related, particularly when you're looking at something that's 12 miles away that's affected very different, differently than an urban area. That that raises some questions. Also, it's not, the concentrations there are not the highest.

MR. GROSSMAN: Well, isn't that, isn't that question whether it's an urban area or not, isn't that subsumed in the question of what's representative? Because my, my question is what difference does it make if it's, if it's closer, but it's less representative, including all those factors, then it's less ideal as a choice of a monitor location, isn't it?

THE WITNESS: Well, okay.

MR. GROSSMAN: It's not really a question of closer, it's a question of representative, isn't it?

THE WITNESS: But my point –

MR. GROSSMAN: And the next question is going to be --

THE WITNESS: Yes.

MR. GROSSMAN: -- what would you select as most representative?

THE WITNESS: Okay.

MR. GROSSMAN: So that's, so there's no secret here, I'm just trying to get your opinion --

THE WITNESS: Right.

MR. GROSSMAN: -- as to what would be, since we have a limited choice, we have monitoring locations --

THE WITNESS: Right.

MR. GROSSMAN: -- that are specific for background --

THE WITNESS: That's right.

MR. GROSSMAN: -- specific locations. They don't move them around so that the modeler can select it. He has to choose a location for the background monitors. So I'm asking you isn't the true criteria the most representative situation?

THE WITNESS: Yes, I would agree with you with the qualification in two points. One is that when you're looking at a large metropolitan area and you choose a site that's on the opposite end of that area and you look at the effect of different wind directions, the sources that affect that site, the urban source will have an effect.

MR. GROSSMAN: Right, but that would make them

less representative.
THE WITNESS: Yes.
MR. GROSSMAN: And still --
THE WITNESS: Yes. Yes.
MR. GROSSMAN: -- ultimately the question --
THE WITNESS: Yes.
MR. GROSSMAN: The question ultimately --
THE WITNESS: Yes.
MR. GROSSMAN: -- isn't that the sole, the real sole criteria --
THE WITNESS: Yes.
MR. GROSSMAN: -- is the most representative?
THE WITNESS: Yes. And I just want to add one more thing --
MR. GROSSMAN: Yes.
THE WITNESS: -- which is even more critical when you're attempting to do an hour-by-hour match because source relationships change on an hour-by-hour basis. So if you have a different alignment of sources, using that hour-by-hour method relative to the monitoring site, okay. You're, if you don't have a site that's representative and that has a very different array of sources that are affected under different wind conditions, you're going to be off the mark. That's why --
MR. GROSSMAN: Now you're dealing with another

question. You're dealing with the uncertainty question. I'm just trying to get to what you would select as, first of all, what is the criteria you use and, secondly, what you would have selected as the appropriate, most representative monitoring site for this modeling.
THE WITNESS: Let me see if I can answer your, in your terms.
MR. GROSSMAN: Because we've critiqued what Mr. Sullivan chose here by the fact that at least for part of it he chose Arlington, but I'm trying to get what you are --
THE WITNESS: All right. Let me get to it. Okay. So my criteria in terms of representativeness would be something that's on the same side of the Washington metropolitan area and other urbanized areas. The second criteria would be what I said about the geography being similar. Now I took a look at the, I believe that's, there's an exhibit of the different monitoring sites.
MS. ROSENFELD: And, Mr. Grossman, if I may interrupt, I'd like to hand that out. It's Exhibit 583.
MR. GROSSMAN: Okay.
MS. ROSENFELD: Everybody has been provided with this.
MR. GROSSMAN: Yes.
MS. ROSENFELD: And this, this one adds one monitor which was discussed by Mr. Sullivan. It adds the

Richmond monitor. But aside from that, this is the same exhibit, 583.
BY MS. ROSENFELD:
Q And, Dr. Cole, perhaps in reviewing this exhibit, it will help you more clearly answer.
MR. GROSSMAN: You don't like me? You don't want to give me a copy?
MS. ROSENFELD: Let me see if I have one more.
MR. GROSSMAN: That's all right. That's okay. You keep it. It's more important that you have it. I've seen it. I saw it when you filed it. So I can always pull it out of the file here. If you have an extra, that's nice. Thank you.
MS. ROSENFELD: That's a loan.
MR. SILVERMAN: That's a loan, right.
MR. GROSSMAN: Not a keeper, huh? But let's get back to the question I asked you. You don't, I don't think you need to reference 583, Exhibit 583 to answer my question. You reviewed the various, I presume because you critiqued Mr. Sullivan about it, you reviewed the various monitoring sites that are available for background information, is that correct?
THE WITNESS: Yes.
MR. GROSSMAN: Okay. So of those that you've reviewed, which monitoring site do you choose as the most

representative of the situation at the subject site if you've made such a choice?
THE WITNESS: Well, I, I have to say I like the VanBuren D.C. monitor. There was a problem with it. It's only got one year of data. So that, in my opinion, would be --
MR. GROSSMAN: So if it's only got one year of data, would that be insufficient for modeling purposes?
THE WITNESS: Yes.
MR. GROSSMAN: Okay.
THE WITNESS: So --
MR. GROSSMAN: Let's --
THE WITNESS: So we have to eliminate that.
MR. GROSSMAN: So which modeling site would you have recommended be chosen as the most representative for this modeling purpose? Well, I didn't mean to put you on the spot in making that selection now. You did not, you have not previously made a determination in your own mind as to which --
THE WITNESS: Okay. There are a number --
MR. GROSSMAN: -- modeling --
THE WITNESS: -- I'm going to put it this way --
MR. GROSSMAN: Well, let me finish the question, okay? Have you previously made a determination of which of the modeling sites that are available and have useful data

for this purpose for modeling should have been selected as the most representative site for this model? Have you made that selection previously in your own mind?

THE WITNESS: I like the area of the northern part of Washington.

MR. GROSSMAN: Do you have a particular monitoring site?

THE WITNESS: But I don't have a particular -- there are a couple there I would have to go back and, and look in greater detail.

MR. GROSSMAN: Okay.

THE WITNESS: So I don't have the answer you want and there were a number of choices that Mr. Sullivan had. He could have done a sensitivity analysis or something or done some averaging and made choices, but he didn't do that. And I'm not sure his choices, which have lower concentrations than some of the other choices, whether he's defended that as being representative and, frankly, I'm not the applicant here.

MR. GROSSMAN: No, that's not -- I'm not, I know you're not the applicant, but I --

THE WITNESS: I don't think that he has defended his choice of site.

MR. GROSSMAN: I understand that. I understand that, but I'm just taking you at what you just said. You

haven't made a selection of a site that you think is better, you just feel that he hasn't sufficiently justified the one he's chosen.

THE WITNESS: Thank you.

MR. GROSSMAN: I understand. Yes. Okay.

BY MS. ROSENFELD:

Q Dr. Cole, I'd like to turn to Mr. Sullivan's stage 3 analysis. And would it help for you to have your slides for that discussion?

A I'm not sure we --

Q Or you can let me know when we --

A I'm not sure we need the slides for --

Q Okay.

A -- to talk about. I mean there are some issues, yes, that will come up later, but I think --

Q Okay. Let me know --

A -- let's just --

Q -- when we're ready for them.

A Yeah.

Q Can -- do you have concerns about Mr. Sullivan's stage 3 analysis?

A I do.

Q And could you discuss them in greater detail, please?

A Well, number one, it's not a method that's

described in the guidance, March 2011, or June 2010. Number two, it, it presumes, it picks arbitrarily NO2 to NOX ratios without justification. And we're dealing with a particular site with particular backgrounds, with a particular sources and to come in and try to assign specific NO2 to NOX ratios based on location just to me is not scientific, not scientifically valid. And it doesn't allow the ozone limiting method. It's not, Mr. Sullivan has acknowledged it's not the ozone limiting method.

MR. GROSSMAN: Excuse me. Can I ask everybody to turn off their cell phones? I realize I have the advantage of taking mine out of my pocket and leaving it in the drawer and you don't, but you can turn them off. Of course, I forgot mine the other night here and I realized how insecure we all feel now without a cell phone with us. But, in any event, you can turn them off. So I'd ask you to do that. Thank you.

THE WITNESS: I have to tell you that I have a new smart phone that I got a few days ago. I feel less secure. I finally figured out how to make a call. There's so many apps --

MR. GROSSMAN: The question is is it smart enough to turn itself off when it comes into my hearing room? All right.

THE WITNESS: I would have no idea.

MR. GROSSMAN: I understand. I just moved into that, that, the 21st century myself, basically, so --

THE WITNESS: Okay. So, can you repeat your question?

MS. ROSENFELD: Yes.

BY MS. ROSENFELD:

Q You were, you were discussing concerns that you had with Mr. Sullivan's stage 3 analysis?

A Right.

Q And I think your last statement was that it doesn't allow for the ozone limiting method?

A It, it assigns, my basic problem with it is it's not in the guidance and it assigns arbitrarily specific NO2 to NOX ratios based on an arbitrary division of the world and to the close end and further out zones. I just -- nature doesn't have strict, box-like lines, particularly the air flows from one place to another. So I, and I don't -- if he's, he mentioned some places where he presumably gets this data from. They may or may not apply to the site. There are other sources of data in the literature that show much higher ratios than .5. So to me it's a very arbitrary choice. He calls it more refined and it, it's his, clearly his least conservative choice and it gets the lowest concentrations and without a whole lot of technical justification in my viewpoint.

Q You've mentioned that Mr. Sullivan's stage 3 method uses caps of .25 within the 40 meter box and loading dock and .5 outside of that area. Do you, in your opinion, are his caps warranted?
A No, I don't think the atmosphere works that way.
Q And do you have any, any information or evidence to support your opinion?
A A lot of what I have to say about that is, applies also to his particular stage 2 ozone limiting method. One of the problems here is that a lot of his thinking, as I've said before, comes from the CAPCOA document which, which, I'm sorry, it's not the CAPCOA, it's the Environment Agency reference that he put on the record. And they grapple with this question of the time that it takes for a plume to mix and the distance that it takes for a plume to mix down to the molecular level. So as I said, he, I believe he draws those percentages from, from that particular study, despite the fact that the study is filled with caveats, and despite the fact that there's a statement in that study that the Environment Agency does not approve of using the Jansen method, which is what Mr. Sullivan relies on, to give you these huge, different distances and times that it takes for molecules of NO to mix with ozone.
As my slides will demonstrate, what happens in a parking lot, in a gas station queue is very, very different

from what happens 300 meters or 400 meters up in the air with a Powerpoint plume and at that, I will need the slides for that.
MR. GROSSMAN: I think the suggestion in his testimony was, if I recall, that it's actually, there's more ozone mixing at those higher levels than at the lower, is that not correct?
THE WITNESS: I absolutely disagree with that.
MR. GROSSMAN: I may be remembering it incorrectly. I --
THE WITNESS: I will give --
MR. GROSSMAN: Okay.
THE WITNESS: -- my reasoning. If that's what Mr. Sullivan said, I cannot agree with it.
MR. GROSSMAN: Okay.
MS. ROSENFELD: All right. I'm going to hand out what had been marked as Exhibit 581, which it is a copy of Dr. Cole's Powerpoint slides. There have been some new slides added there, all taken from other documents in the record.
MR. GROSSMAN: While that's being done, do you feel that there's any increase in the, the repetivity of the conversion from NO to NO2, from NOX to NO2 after you've traveled the distance, after the, the NO has traveled the distance or do you feel that the traveling distance does

not, is not relevant?
THE WITNESS: It's, it's, the distance may have an impact on what, on the primary NO2. And then if you, I think I agree with --
MR. GROSSMAN: Primary being the, what you call --
THE WITNESS: In stack.
MR. GROSSMAN: -- the in stack?
THE WITNESS: -- in tailpipe.
MR. GROSSMAN: Right, what's --
THE WITNESS: So, yes, driving mode has a lot to do with --
MR. GROSSMAN: Not driving mode, but I, but there was, in Mr. Sullivan's testimony he talked about, that's why he had that for the box part, or he had, I mean he talked about the time for the NOX to travel in order to mix. Is that not a, or the distance of travel. Is that not a factor in your evaluation?
THE WITNESS: Not --
MR. GROSSMAN: Distance from the source?
THE WITNESS: No.
MR. GROSSMAN: Okay.
THE WITNESS: Can I have a copy of the slides please? I've added this as an exhibit, but there may be one or two additions that come from sources which are referenced.

MR. GROSSMAN: You are going to explain to me what the top one means, right?
THE WITNESS: Yes, absolutely, yes.
MR. GROSSMAN: Okay.
THE WITNESS: I'll start with that. I testified earlier today that there had been many revisions of Mr. Sullivan's modeling reports and it's sometimes very hard to figure out exactly what's changed as the, he uses more and more complexity. So this slide is a copy of the Washington Post's photo puzzle that appears in this Sunday magazine section and there's photo one and photo two, and you have to figure out where the differences are.
MR. GROSSMAN: Well, to me, with the, with that in general, but -- so I take it this is kind of an allegory in your mind for, for Mr. Sullivan's various reports?
THE WITNESS: Yes. Yes.
MR. GROSSMAN: All right.
THE WITNESS: Okay. So we're going to go to -- in order to explain my judgments on the rate of mixing to the molecular level, particularly in the close in area risk where Mr. Sullivan assumes there's no contact between ozone, no contact between ozone and O from the queue, for example, from the sources within the box. So the, I want you to go to Slide No. 6, please.
And I'd like to give a little background on

turbulent mixing. So these are three pictures of three different discharges of plumes from sources. And they look similar because there's a, a property of turbulence that it looks the same at different scales. So if we go to the second one --

MR. GROSSMAN: I don't know if they look similar, but --

THE WITNESS: Okay.

MR. GROSSMAN: -- that's a matter of looking and I suppose --

THE WITNESS: Right. Well, there's some --

MR. GROSSMAN: -- to the difference on --

THE WITNESS: -- would you buy that there's some similarity? Okay. Go to the second one. This is the sources of these three different pictures that I've showed. So the first, the first is a cigarette, the second is a tailpipe and the third are plumes from power plants, from stacks. And if we think about someone smoking, you see the smoke, particularly of people who are walking around in the room and whatnot, will dissipate pretty quickly and over a short distance.

For car exhausts, and I'll show some slides of this, the dissipation takes place maybe in a matter of meters, 10 meters, five meters. But the power plant plume from which the Jansen study and the environment agency

graphs which Mr. Sullivan has used come from these power plants. And you can look and see that these power plant plumes are, in fact, dispersing. Now we're looking at distances of hundreds of meters here, maybe 100 meters, maybe 150, 200, depending upon the conditions. Another way of looking at this is on page --

MR. GROSSMAN: So what do I conclude from that?

THE WITNESS: What you conclude from that, and I will further amplify on it, is that the degree of, the rate at which mixing occurs down to the molecular level is a matter of scale. If you're dealing with a very small source with a smaller plume, that is going to disperse and mix a lot faster than the giant plume of a power plant.

MR. GROSSMAN: Okay.

THE WITNESS: So a basic premise of, of turbulence theory is embedded in this quote from Lewis Fry Richardson.

MR. GROSSMAN: What page is that?

MS. ROSENFELD: The next page.

THE WITNESS: What?

MS. ROSENFELD: On slide, page 8.

THE WITNESS: That's the one after the cigarette.

MS. ROSENFELD: Yeah. They're paginated on the lower right, some of them are hard to read --

MR. GROSSMAN: Well.

MS. ROSENFELD: -- but there are page numbers.

MR. GROSSMAN: Oh, I see, page 8. Okay. I see it.

THE WITNESS: Okay. Big whirls have little whirls that feed on their velocity, and little whirls have lesser whirls and so on to viscosity. Now viscosity is basically turbulence of the molecular level.

MR. GROSSMAN: Yes.

THE WITNESS: Okay? Now what drives the turbulence is an energy source. So it, one form of energy is the flow of air over a rough surface. The energy is in the kinetic flow, the kinetic energy of the moving wind, but as the turbulence disrupts that, that kinetic energy is dissipated and eventually it will go down to the molecular level. So you're getting a very organized form of energy transferring to a very dispersed form of energy is another way of looking at this.

Now, the next slide you see the big swirls going to the little swirls and whatnot, but my point of the second is that here we have a power plant plume with great, big swirls and a car exhaust with smaller, and my point is that it takes less dissipation to get these smaller plumes down to the molecular level.

MR. GROSSMAN: I see.

THE WITNESS: So if we look at Slide 10, you can see the amount of turbulence that's occurring very close to

these cars. Now I'm not suggesting that -- this may be steam, it may be vapor, but whatever it is is dissipating rapidly. The turbulence, and Mr. Sullivan has talked about the roughness. He has used this argument that, that you would have a lot of mixing in the, as one of his defenses for using urban coefficients that there's turbulence. Well, I contend that he's only looked at one part of the equation in doing that.

That this, the turbulence has a number of effects and if we go to page, well, we can look at the Slide 11, which again, looks at the difference between a power plant plume which the Jansen dissipation distances or distances of molecular mixing, you can see this power plant that's probably fairly stable conditions, conditions that Mr. Sullivan says leads to the highest NOX and highest NO2 concentrations and you can see that there's, that plume under those conditions is holding pretty firm. It's not doing a lot of mixing, whereas if you look at a parking lot, let's say in a cold morning when you've got a lot of traffic going on, you're going to get turbulence at the scale of these particular exhausts with a lot more mixing because of the roughness of the surface. These cars, I believe Mr. Sullivan testified that you might be looking at a roughness, surface roughness value of maybe a meter or maybe more. It's quite a rough surface, so it induces turbulence. But

it has another effect as well which we need to look at, which is Slide No. 4, which I'm sure Mr. Sullivan is familiar with. It's one of the basic premises of the impact of surface roughness on the wind profile.

It's generally known that wind profiles in terms of their speed have a lot of rhythmic shape and that the greater the surface roughness, the lower the velocity in the lower layers. And this particular source is given here. I did the two meter calculation. But it shows that the greater the surface roughness, the slower the wind speed at the height of these automobile exhausts and upward some. Interesting, if you look at the very lowest, .1, you'll see that there's a huge difference between the surface and what's going on aloft. There's a tremendous drop, a tremendous increase in wind speed, and that's because with a smoother surface, there's less turbulent exchange and so the momentum from above is not being transferred downward.

Whereas, if you look at the two meter curve, the two meter surface roughness curve, you see it's pretty uniform, but with much lower wind speeds. In other words, under these conditions, the lower atmosphere tends to be decoupled from what's going on aloft. And so wind speed, and my point in all this is that the wind speed is less and we know one of the most basic premises of air pollution meteorology is that concentrations are inversely

proportional to wind speed. So its surface roughness, these elements are slowing down the wind speed. That means concentrations will be increasing.

So there are other sides to the whole issue about turbulence and my contention, if you look at No. 5, the rebuttal report cites that Jansen formula as graphed in the Environment Agency report to show that there is insufficient time for car exhaust in the queue area, the 40 meter, I call it the no zone, to mix down to the molecular level. However, as the Environmental Agency report states, this equation was determined for power plant plumes, not for car exhaust occurring at the surface. And it, I can get the page number, but it basically states, I think I've got this. I'll give you the page number, but it states that the Environmental Agency does not approve of using the Jansen curves for ground level sources.

MR. GROSSMAN: Since using the term Environmental Agency, I think we should be clear, it's not the EPA --

THE WITNESS: No.

MR. GROSSMAN: -- you're talking about?

THE WITNESS: No. No. It's the, I believe it's the English Agency.

MR. GROSSMAN: I think you originally thought it was Australia, but it may have been in Canada, is that --

MS. ROSENFELD: Britain and Wales.

MR. GROSSMAN: Britain and Wales, I'm sorry. Okay. Well, in any event, I understand your point. So you can go on to the next point.

BY MS. ROSENFELD:

Q Now, Dr. Cole, you had also testified about the .5 cap, conversion cap, and we're still talking about stage 3, the stage 3 method now. And I believe that Mr. Sullivan, I think, testified that he took those caps from various reports. One of them may have been the Sonoma report. Did you review a report by Sonoma Technology, Inc., that Mr. Sullivan referenced?

A Yes, I did.

Q And what is your opinion having, having reviewed that report?

MR. GROSSMAN: Are we talking about the -- which --

MS. ROSENFELD: We're talking about the Sonoma Technology, Inc. --

MR. GROSSMAN: No, I know, but --

MS. ROSENFELD: -- summary of results.

MR. GROSSMAN: -- but which, which ratio are you talking about?

MS. ROSENFELD: This would be the .5 cap outside of the four year freeze.

THE WITNESS: Well, the, the evidence that I show,

let me --

MR. GROSSMAN: Ms. Rosenfeld, were you done with the air monitor location slides? I was supposed to return them. I didn't want to be accused of, of prolonging in any way. What page were you, was that?

MS. ROSENFELD: Thank you.

MR. GROSSMAN: You're welcome.

MS. ADELMAN: Michele, which, what are you talking about?

MS. ROSENFELD: This is Sonoma Technology, Inc.

MR. GOECKE: Could you show us that, please. Dr. Cole?

MS. ADELMAN: Can you show --

MR. GROSSMAN: Oh, I'm sorry.

MS. ADELMAN: -- Mr. Goecke?

BY MS. ROSENFELD:

Q And the date on that?

A December 2011. It's a report called, Summary of Results from Near Road NO2 Monitoring Pilot Study, December 2011.

MR. GROSSMAN: Is this something that's we've just referenced or is it already in --

MS. ROSENFELD: It was just referenced. I don't remember if it was admitted into the record or not. I don't see it in the exhibit list.

MR. GROSSMAN: Ms. Harris or Mr. Goecke, do you recall --
MS. HARRIS: I don't think it was.
MR. GOECKE: I can't recall.
MR. GROSSMAN: I don't think, I think it was just referenced by Mr. Sullivan.
MS. ROSENFELD: I think it was discussed, but not entered.
MR. GROSSMAN: All right. Do you want it?
MS. ROSENFELD: Yes, please.
MR. GROSSMAN: Okay. So if I can find the exhibit list, then we'll --
MS. ROSENFELD: And it's almost noon and this is our first new exhibit.
MR. GROSSMAN: Wow. Of course, you've, you've passed 600 now, so I'm not sure it can be allowed. There's got to be some, some limit on, on exhibits. All right. So this will be 602 and that is the December 2011 final, well, I guess it's called summary of results from near road NO2 monitoring pilot study, and I guess it's prepared by STI, that's Sonoma Technology, Inc., for the EPA.
(Exhibit No. 602 was marked for identification.)
MR. GROSSMAN: While we're, since you, you -- it mentions the near road NO2 monitoring. Can you give some

testimony about how to interpret EPA standards for, let's say NO2 one-hour standards. And let's say the standard is 100 parts per billion. There's been a suggestion made that that's for near road and the actual standard is below that when you go further off the road. Do you subscribe to that interpretation of the EPA regulations?
THE WITNESS: Not being an attorney --
MR. GROSSMAN: I'm asking you for the way in which it's to be interpreted by the EPA, not as an attorney.
THE WITNESS: Let me try and answer this way, that is you believe that the traffic may not be, may create high concentrations near the roadway. Then you might have some homes that are maybe 100 or meters away.
MR. GROSSMAN: Okay.
THE WITNESS: So I have seen language in various documents that acknowledges that concentrations within, away from the road may be lower, but that the standard based on maximum concentrations is set higher as -- you know, I was afraid you would ask that question.
MR. GROSSMAN: Oh, well, I didn't know I inspired to, but --
THE WITNESS: I, it's a very hard -- I haven't seen that in the guidance, let me put it to you that way. I have, I know it's, there have been a lot of reports like CASAC reports and whatnot that have discussed this issue.

So I think in this particular case what we're looking at is the maximum concentrations associated with this particular source added to background anywhere in the neighborhood and that's, that, I think, is the criteria which my review of all of this is based on that. Without getting into that, I think it almost, it's almost an issue that is a health-related issue because, you know, if you have this level here, what, what level is in a micro-environment of a person breathing, sensitive populations. I can't really --
MR. GROSSMAN: What I'm trying to get at, in, and the EPA applies its NAAQS standards, if it has a standard of 100 parts per billion for a particular pollutant, does it apply that across the board or does it have some sort of metric where it lowers it in applying it further away from the road?
THE WITNESS: I'm going to answer in the context of this particular case.
MR. GROSSMAN: Well, just so, first of all, let's get it in general, how it applies. You've worked for the EPA. How does it apply it? How do they apply their standards?
THE WITNESS: Generally, anywhere where there's an exceedence, there's an exceedence.
MR. GROSSMAN: An exceedence of the specific standard, not of some graded level below that?

THE WITNESS: I haven't seen that.
MR. GROSSMAN: Okay.
THE WITNESS: So in a particular case, you're doing a modeling study, combining it with background, and if at anywhere, in this case in the neighborhood, those values are exceeded, that's a problem.
MR. GROSSMAN: Well, but the values being exceeded you're talking about are the actual NAAQS standards?
THE WITNESS: That's what I'm --
MR. GROSSMAN: Okay. All right. Thank you. Go ahead.
BY MS. ROSENFELD:
Q Dr. Cole, we were talking about the stage 3 analysis and the cap in particular of the .5, I believe, outside of the, outside of the tailpipe box. And you testified you didn't think that that .5 was justified. And do you have --
A Well, let me --
Q -- do you have studies or information that would support your conclusion?
A Let me start first with the 40 meter zone and that's where I reference the, the Sonoma Technology report which we just gave the reference for. And Table 33 and Figure B9 shows much higher concentrations within 40 meters of the road.

Q And, Dr. Cole, could you identify what page Table 33 is on? And this would be Exhibit 602. Or Table, page 3-18, tell me if it's on that page.
MR. GROSSMAN: We'll let you get away with leading now.
MS. ROSENFELD: In the interest of saving time.
MR. GROSSMAN: Anything in the interest of saving time.
THE WITNESS: Well, one is, the table is on page 318 and the graph is Figure B-9, that will be in the appendix. B-9 is on page 318. And as the table shows, those ratios, even the average ratios in three of the four cities studied are greater than, greater than .5 and certainly greater than .25. These are in the, these were, there are within 40 meters. So I just put this in to show that there is data out there which does not restrict a high ratios cap by .25 within 40 meters.
Now in terms of going out beyond the 40 meter box, there, there's something, there's a concept and an equation known as the photo stationary state so that you get ozone forming, I'm sorry, you get NO2 forming with the reaction of ozone and initially you have a certain NO2 to NOX background and that's dictated by, as we've said, by the turbulent mixing, but the reaction itself is very fast. We're talking about seconds. So the issue --

MR. GROSSMAN: Once it's at the molecular contact point?
THE WITNESS: Yes. Yes. So the issue which both Mr. Sullivan and I agree on is the rate of mixing down to the molecular level. So here we see ratios that are much higher than .25. Now when we go to beyond the 40 meters, we're talking about --
MR. GROSSMAN: Hold on one second. I just want to ask you in terms of this --
THE WITNESS: Yes.
MR. GROSSMAN: -- Table 33 that we're looking at, it talks about near road, it's measuring near road. How is near road defined?
THE WITNESS: Within, I believe all of these sites are within 40 meters.
MR. GROSSMAN: Because I just want to make sure we're not comparing apples and oranges.
THE WITNESS: It says distance from road --
MR. GROSSMAN: Where, where does it say distance from road? I just want to see --
THE WITNESS: Now we're looking at Figure B-9.
MR. GROSSMAN: Figure B. Let's see. What page is that on?
THE WITNESS: That is on page, oh boy --
MR. GROSSMAN: What is it?

MR. GOECKE: I'm sorry, you're talking about any appendix, Figure B --
MR. GROSSMAN: B, yeah, B-9.
MR. GOECKE: -- is, I think it is on --
MS. ROSENFELD: I think it's B-11.
MR. GOECKE: B-11, yes.
MR. GROSSMAN: B-11? Okay.
THE WITNESS: Right.
MR. GROSSMAN: Distance from -- so I'm still not quite sure whether, which part of these are considered -- I agree that the graph appears to go out to 40 meters based on the, the X axis, but which part of that is considered near road for purposes of interpreting Table 3-3? That's what I'm not sure of.
THE WITNESS: Well, I think you can say that -- you're talking about the table, not the graph?
MR. GROSSMAN: Well, I guess I'm talking about either one because the graph is, doesn't show distances either, it just shows, compares the ratios with ozone parts per billion, one, so I don't see anything on Table 3-3 that's telling me that that near road means within 40 meters as opposed to within 10 meters. I, that's all I'm asking. I'm just asking for definition of near road as it's used in Table 3-3.
THE WITNESS: No, I think I'd look into that a

little, I will look into that a little deeper, but you can see that the, for Baltimore, if you look at the distribution of points --
BY MS. ROSENFELD:
Q Are you looking at Figure B-9?
A B-9, Figure B-9.
MR. GROSSMAN: B-9?
THE WITNESS: Yeah.
MR. GROSSMAN: Figure B-9 or --
MS. ROSENFELD: On page B-11.
THE WITNESS: On page B-11.
MR. GROSSMAN: Okay.
THE WITNESS: The values are not terribly different from what are given in the --
MR. GROSSMAN: I see.
THE WITNESS: -- table.
MR. GROSSMAN: So, so you can, the table on B-9, on page B-11, confusing as that labeling system, okay, but Figure B-9, dash 9, I, I can see there that does compare ratio levels, that's NO2/NOX ratios against distance from the road --
THE WITNESS: Yes.
MR. GROSSMAN: -- in meters?
THE WITNESS: Right.
MR. GROSSMAN: Okay. So that answers my question.

Okay.
MR. GOECKE: Can we have a brief break, Mr. Grossman?
MR. GROSSMAN: Yes. All right. Come back in five minutes.
(Whereupon, at 12:03 p.m., a brief recess was taken.)
MR. GROSSMAN: All right. We can resume. We're back on the record.
BY MS. ROSENFELD:
Q Dr. Cole, I think when we ended, you were starting to talk about a photo stationary state. Is that a concept that you wanted to explain further?
A At some point there's an equilibrium.
Q Could you speak up just a little?
A What happened -- what?
Q Could you speak up --
MR. GROSSMAN: A little louder.
THE WITNESS: Oh.
MS. ROSENFELD: -- a little?
THE WITNESS: Oh, okay. When you're dealing with a, let's say a plume, which is mixing into the atmosphere and you've got NO that begins to react with the ozone as the mixing comes down to the molecular level. There's a theoretical limit to, based on, particularly during the

daytime when the sun is out because the sun will actually break down NO2. So you've got to consider all of those things and the photo station as the equation gives you an upper bound that's not 100 percent, it's 85 percent. In other words, the NO2 to NOX ratio is .85. When everything comes into equilibrium, the ozone, the NO, the effect of sunlight, sometimes it considers other accidents which may have an influence, but basically at some point you're going to get to the .85.
Now there's also, if you're going to have an upper bound in my opinion, beyond the one that you can justify beyond the 40 meters in particular, it should be the photo stationary state which is not too different from what EPA has picked as its 80 percent default in its tier 2 method.
Okay. And EPA in its guidance states that it went up the maximum ratio, the default value they raised from .75 in 2010 guidance, they raised it to .80. So, and they have some justification for that in the --
MR. GROSSMAN: You mean for tier 2?
THE WITNESS: For tier 2.
MR. GROSSMAN: But they still have tier 1 as 100 percent even though, I take it that's giving a margin of error because if what you're saying is correct, that it's .85 is the ultimate conversion ratio, the stationary point, photo stationary point?

THE WITNESS: Right, but they recognize, in tier 1, you're basically recognizing that there are a lot of uncertainty, so they're giving you some very conservative --
MR. GROSSMAN: Right. Okay.
THE WITNESS: So --
MR. GROSSMAN: All right.
THE WITNESS: -- there is evidence, I would refer, let's see, this is, I don't believe it's in the record, but there's a report by, a 2009 report by Minoura using data from Japan that they presented at the 7th International Conference on Urban Climate, July 2009, where he shows NO2 over NOX ratio as a function of distance and he has three monitors in this study, one right at the roadside, the second at 20 meters and the third at 100 meters from the roadway. So the values are right at the roadside is .56. At the 20 meter site it goes up to .68, and at 100 meters, in other words, well beyond the 40 meter zone he has a value of .65. So --
MR. GOECKE: Dr. Cole, do you have a copy of that report?
THE WITNESS: I -- can I get that, well, I have it --
MR. GROSSMAN: Where are you, where are you reading from?
THE WITNESS: I'm reading from a table, I'm sorry.

I'm reading from Table 1 of his paper. And I will provide that.
MR. GROSSMAN: Is this something that's been exchanged or are we, where did we get this from?
MS. ROSENFELD: I don't believe so. I don't believe so.
THE WITNESS: Okay. My point --
MR. GOECKE: I would move to not allow him to testify unless we are provided a copy.
MR. GROSSMAN: Yeah. And I don't, I don't see that it's going to change anything either, so, yeah, I'll strike that, that reference.
THE WITNESS: All right. Then let me read -- here is something from something that's in the record which is the environment agency report.
MR. GROSSMAN: The EA one --
THE WITNESS: Yes --
MR. GROSSMAN: -- that's in the Wales --
THE WITNESS: -- which -- right, which Mr. Sullivan relies on.
MR. GOECKE: What exhibit number is that, do you know?
MS. ROSENFELD: You know, I don't --
MR. SILVERMAN: It was on the, it was on the disk --

MS. ROSENFELD: I don't that it was exhibitized.
MR. SILVERMAN: -- the ones that you sent us.
MS. ROSENFELD: Yeah.
MR. SILVERMAN: You sent us a disk with a lot of references.
MS. ROSENFELD: You provided it. It was Reference No. 1 in Mr. Sullivan's report, on page 21 of his report. I have a copy, but I don't believe it was ever admitted or entered into the record. He testified about it, but I don't believe you entered it.
MR. GROSSMAN: So what's your comment with that in that regard?
THE WITNESS: Here's a quote, and please forgive me, I don't have the page number, but we can get it from the environmental agency report, quote, at rural sites, NO2 is frequently 60 percent or more of the NOX and the NO2 to NOX ratio tends towards its daytime equilibrium value associated with the photo stationary state of .85. At urban sites such as central London, NO2 to NOX ratios average .47 in winter and .59 in summer.
So you're seeing data here and indications that you would have to really defend that 50 percent level that Mr. Sullivan uses because there are indications in the literature for higher values. So I'm not convinced that, either by the science or by the various reports and

literature that, that there's a justification for a .50 cap, which is what, what he does in his stage 3 analysis.
MR. GROSSMAN: Okay.
BY MS. ROSENFELD:
Q And, Dr. Cole, again, still on stage 3 of the analysis, in -- what is your understanding of how many years of meteorological data that Mr. Sullivan uses in his stage 3 analysis?
A He uses, in stage 3 he uses three years of data.
Q And is that consistent with EPA guidance?
A Oh, that's meteorological data. No, the EPA guidance states that unless you have an onsite monitor, meteorological monitors station, that you use five years of meteorological data. Now there's a reason for that and that is that within a three year period, and one could even argue for a longer period of time, but in a three year period you don't really know whether you're looking at a trend, at something that's representative, or whether you're really looking at a particular windy year, for example, or a year with a particular flow of, of air. Like this winter we had a lot more northerly winds than is usual. We had some very cold temperatures during the winter. All of that, temperatures and wind direction and wind speed vary from year to year.
So when I was at EPA, I was very interested in

working with the guy who does trend analysis and they always factor in the, when they look at a trend, they try to factor out the effect of variable meteorology and say, well, this was a windy year, we can't, or a rainy year, so particulate monitors are going to read less or whatever. So the shorter the timeframe that you choose, the less you can guarantee that you're really being representative of the conditions that prevail over time, okay?
Q And is there guidance in Appendix W on that point?
MR. GROSSMAN: I mean it's apparent. It's sort of, you're, the period you're measuring or less have an indication of trend --
THE WITNESS: Yeah, it says --
MR. GROSSMAN: -- over a period of time? Nobody is going to challenge that, all right?
MS. ROSENFELD: I'm not questioning with respect to the trend analysis. I'm, I'm questioning with respect to the five year --
MR. GROSSMAN: Oh, I see, as a standard for --
THE WITNESS: Yes.
MS. ROSENFELD: As a standard.
THE WITNESS: It's --
MR. GROSSMAN: What --
THE WITNESS: Well, Appendix W is very clear that, they give you two choices. One, if you have an onsite

monitor and you can use three years, but if you don't, you have, you use five years.
MR. GROSSMAN: But, but counsel is looking for a page reference or section reference for that.
THE WITNESS: Oh.
MR. GROSSMAN: Is that, is that correct?
MS. ROSENFELD: That's correct.
THE WITNESS: This is the environmental, wait, what are we looking at? This is the --
MR. GROSSMAN: You said the --
THE WITNESS: I'm sorry.
MR. GROSSMAN: -- the Appendix W?
THE WITNESS: Yeah. Yeah. Okay. Okay. The guidance states five years, and this is on page 68244, 8.3.1.2 --
MR. GROSSMAN: All right, page 68?
THE WITNESS: 244 --
MR. GROSSMAN: 244, section what?
THE WITNESS: Appendix W, 8.3.1.2, five years of representative meteorological data should be used when estimating concentrations within an air quality model.
MR. GROSSMAN: Okay.
THE WITNESS: Okay.
BY MS. ROSENFELD:
Q And do you know if either of the EPA guidance

memos further elaborates on that point?
A Let's see. Well, I haven't seen anything to the contrary.
Q And in your opinion what is the effect of using three years of meteorological data --
MR. GROSSMAN: He's already answered that.
MS. ROSENFELD: -- as compared -- okay.
MR. GROSSMAN: Yeah.
MS. ROSENFELD: Mr. Grossman, the next topic that I'm going to get into is going to take some time. This might be a good time for a lunch break.
MR. GROSSMAN: What is the next topic?
MS. ROSENFELD: NO2 monitoring.
MR. GROSSMAN: Okay. What's the pleasure of the crowd? Do you want to break now or to struggle on?
MS. HARRIS: Can we have one moment?
MR. GROSSMAN: Yes.
MS. HARRIS: Struggle.
MR. SILVERMAN: Lunch.
MR. GROSSMAN: Mr. Silverman always votes for lunch, even when there's liver.
MS. HARRIS: Michele, how much longer do you expect after that topic?
MS. ROSENFELD: I would expect we would be done within a couple of hours.

MR. GOECKE: Including that topic or after that topic?
MS. ROSENFELD: Including that topic.
MR. GOECKE: I'm indifferent, so why don't we take lunch?
MR. GROSSMAN: All right. So so far I only have one vote here to count.
MS. ROSENFELD: Well, I vote.
MR. GROSSMAN: Two votes, two votes for lunch?
THE WITNESS: Do I count?
MR. GROSSMAN: You, absolutely you count. It's your birthday. You count double. What are you voting for?
THE WITNESS: Two hours of lunch.
MR. GROSSMAN: No, no, no, they don't count that much. Let's not overemphasize. So but in terms of timing, do you want to do the lunch break now, is that right?
THE WITNESS: Okay.
MR. GROSSMAN: All right. So we'll break for lunch now and come back at 1:15.
MS. ROSENFELD: Thank you.
MR. SILVERMAN: Thank you.
(Whereupon, at 12:29 p.m., a luncheon recess was taken.)

A F T E R N O O N S E S S I O N
MR. GROSSMAN: Go back on the record. We'll resume the direct sur rebuttal testimony of Dr. Cole.
BY MS. ROSENFELD:
Q Dr. Cole, just to clarify a few points from this morning's testimony --
A Right.
Q Using the hour-by-hour method, does EPA guidance have a recommendation as to what types of sources are appropriate for hour-by-hour?
A Well, it does. It's clear that, that it wants justification and it's also clear that there are only, would approve that kind of method if it can be shown that the site is isolated. So there's evidence from Mr. Sullivan's report that the site is not at all isolated. I gave some evidence but, in fact, if you look at Figures 2 and 3 --
MR. GROSSMAN: What are you referencing? You need to give me a page reference. What page are you referencing and what document?
THE WITNESS: Okay. If you look at the rebuttal report.
MR. GROSSMAN: The rebuttal report?
THE WITNESS: Yeah, page, Figures 2 and 3.
MR. GROSSMAN: No, I mean for your, for your reference to what EPA --

THE WITNESS: Oh.
MR. GROSSMAN: -- requires, an isolated --
THE WITNESS: Okay. That would be, that's the Fox 2011.
MR. GROSSMAN: All right.
THE WITNESS: And that is --
MR. GROSSMAN: Exhibit 407, and what's the page reference you're talking about there?
THE WITNESS: Page 21.
MR. GROSSMAN: All right. So you, you read the highlighted portion?
THE WITNESS: Right.
MR. GROSSMAN: Oh, I see. So you're talking about this last sentence in the highlighted portion, therefore, we do not recommend such an approach except in rare cases of relatively isolated sources, is that what you're --
THE WITNESS: Yes.
MR. GROSSMAN: Okay. All right.
THE WITNESS: So if you look at the rebuttal report where it gives the results of the stage 2 and stage 3 modeling, you'll see that the background for stage 2, accounts for 44 to 50 percent of the high 98th percentile total concentrations. And for stage 3 it's even higher, it's 63 percent is accounted for by the background concentration. Without saying anything about the

representative, most of the background, it's clear that this is not an isolated source. If it was an isolated source, it would have much lower background from other sources, so this is not, does not, in my judgment, meet the criteria for this, for the rare exceptions that they are willing to endorse hour-by-hour paired matching.

MR. GROSSMAN: Okay.

BY MS. ROSENFELD:

Q And so looking at, looking at Figure 2, can you --

MR. GROSSMAN: Figure 2 in what?

MS. ROSENFELD: Figure 2 in the rebuttal report on page 12.

MR. GROSSMAN: Okay.

BY MS. ROSENFELD:

Q Looking at the blue box on the right-hand side of that page, could you just read the relative numbers that you're looking at to make that comparison or to reach the conclusion that this is not an isolated --

A I think, let me make sure I have it.

Q And if not, I'll just --

MR. GROSSMAN: Yes, if you could show me, that would help. Figure 2 on page 12?

MS. ROSENFELD: Figure 2 on page 12.

BY MS. ROSENFELD:

Q If you can take a look at the numbers? As I

understand, on the upper right, those are the numbers associated with the queue, of the loading dock and on the lower left?

A Okay. The background for --

MR. GROSSMAN: No, I think the, the upper right is at the loading dock and the lower left is at the queue?

MS. ROSENFELD: Correct. You're right.

THE WITNESS: Those are the maximum impacts where those sources contribute and my point is that these, if you look at the background concentrations, they're anywhere from 40 to 50 percent, roughly, of the total concentrations. On my judgment, that does not qualify as an isolated source. Then if you go to Figure 3 and you look at the background concentration there, it's, I think I calculated it's more than 60 percent of the total.

So to say that, that this is an isolated source which would qualify for EPA's exception, in my judgment it doesn't qualify.

MR. GROSSMAN: You count background in there when you determine isolation of the source?

THE WITNESS: I would.

MR. GROSSMAN: Well, is that what EPA calls for when they, in that language in Exhibit 407, when they talk about an isolated source, are they referring to something in which you're including background as determining whether or

not a source is isolated? I just don't see how -- I'm not quite sure, and you can explain to me, how one is every isolated if background is a factor in that determination as to isolated. You always have background, right?

THE WITNESS: You're dealing with an urban area with a lot of vehicles and a lot of NOX emissions --

MR. GROSSMAN: Right.

THE WITNESS: -- and so in my judgment it, what we're looking at here is can you apply hour-by-hour pairing.

MR. GROSSMAN: Right. I'm not arguing with your judgment --

THE WITNESS: So --

MR. GROSSMAN: -- I'm just trying to get, to understand how you factor in background in your conclusion that the source here is not isolated. That's what I don't understand. Wouldn't you always, well, background, I just don't understand.

THE WITNESS: Well, your background would not be reflective of these urban areas if it were isolated. I don't believe that, my opinion is that this would not apply to any, the exception to allow paired matching --

MR. GROSSMAN: Right.

THE WITNESS: -- modeling and monitoring hour-by-hour --

MR. GROSSMAN: Yes.

THE WITNESS: -- is not appropriate in an urban area with many, many sources. And the only reason I mention this is that these background concentrations in my judgment reflect many sources. We know there are many vehicles and sources outside of the modeling perimeter and to call this an isolated source --

MR. GROSSMAN: Outside of the modeling perimeter or outside of the 40 meter box?

THE WITNESS: No, outside of the modeling.

MR. GROSSMAN: Well, then I really don't understand your, your argument. You'll have to --

THE WITNESS: Well, this --

BY MS. ROSENFELD:

Q Dr. Cole, earlier you made a reference to, I think, a power plant and a prairie?

A Yeah.

Q Is that the comparison that you're making?

A Yeah, if you had a source that was distinguishable from anything else because there were no other emissions, then I think it would be fair to do this hour-by-hour matching because in an isolated area, it really doesn't matter which way the wind is blowing because there aren't many sources. So you can do an hour-by-hour match in that kind of case because, because the, because the, you're not going to have big differences. Here you're taking one

monitor, okay, and, and, and expecting the source receptor relationships on an hour-by-hour basis to be the same, even though there are lots of sources around these different monitor sites.

MR. GROSSMAN: I understand your point. I think what confuses it is by using the, by flowing into your analysis the term background in which there's always background and so that -- but your fundamental argument is that there are other sources in the area here, it's not an isolated source as compared to the power plant and the prairie. There are other sources that are not just background, included in background and so I think that's your fundamental point, but I think I understand that point. Okay.

THE WITNESS: Okay.

BY MS. ROSENFELD:

Q Dr. Cole, were you present when Mr. Sullivan was going through the Panofsky formula in his application of that --

A Yes.

Q -- with his modeling analysis?

A Right.

Q In your opinion, is that an appropriate methodology to use in this case?

A Well, it's, it's not a methodology that's included

in any guidance. I think --

MR. GROSSMAN: You're saying the Panofsky formula that Dr., that Mr. Sullivan mentioned or some other, he's, he testified that that particular formula was derived from others. Are you saying that any manifestation of that formula, formula is not appropriate or are you just saying that particular --

THE WITNESS: Let me just back up a little bit.

MR. GROSSMAN: Okay.

THE WITNESS: I think Mr. Sullivan, I won't speak for him, but I agree with his concept having dealt with transitional barriers. It's clear that there's a, you know, if wind is coming from the south, for example, it's crossing one kind of area and coming into another. I testified that there's going to be a transition zone.

MR. GROSSMAN: Right.

THE WITNESS: With more turbulence over the parking lot, over the mall surface for various reasons, okay? I don't think that's the contention here. I, the issue is the particular values that he gets are the applicable -- is this a proven method? Is it a method that's embraced in any, or even mentioned in any guidance. So, and my problem with it is that he uses this, well, he uses it to show that the, if you have a wind let's say from the south, by the time it reaches the gas station, that

you're going to have enhanced turbulence and it could be characterized as urban rather than rural, okay?

Without taking an issue, without rehashing the urban and rural dispersion thing, the problem, the problem I have is twofold. One is that he doesn't give the qualifications that the author gives for the equation. And let me read that.

He gives this equation which Mr. Sullivan correctly transformed. We don't have any arguments with his calculus.

MR. GROSSMAN: Okay.

THE WITNESS: That's fine. But here's the qualification. It says considering neutral conditions in the surface layer, we can substitute the logarithmic profile into one and integrate with the initial conditions, which is basically what Mr. Sullivan did. But it says for these neutral conditions, the -- and I'm reading directly -- Myocki's treatment gives only the geometry of the interface, but not the change of wind speed, the stress and turbulent intensity after the air comes under the influence of the terrain change.

MR. GOECKE: Excuse me, Dr. Cole, where are you reading from?

THE WITNESS: This is from, directly from the Panofsky and Dutton report. I think it was 1984.

MR. GROSSMAN: It was a text, as I recall.

THE WITNESS: A text and it's one of the first of the two, first or second of the two pages that Mr. Sullivan provided.

MS. ROSENFELD: I'd proffer it's page 150 --

MR. GOECKE: Thank you.

MS. ROSENFELD: -- of the Panofsky excerpts.

THE WITNESS: So the problem I have with this is that when, when you give a method, particularly a method that's not been vetted and included in EPA's regulations --

MR. GROSSMAN: Well it goes --

THE WITNESS: -- or guidance --

MR. GROSSMAN: -- it does not, you say it hasn't been vetted, it's been around since 1984, so I don't know that it hasn't been vetted, but you're saying it has not been included specifically?

THE WITNESS: Right, not that I'm aware of.

MR. GROSSMAN: Okay.

THE WITNESS: Not that I'm aware of. And it has two qualifications here. One is the fact that it applies to neutral conditions. And according to Mr. Sullivan's modeling, he sees the maximum concentrations occurring at stable conditions; when there's very low wind speed, early in the morning or later in the afternoon when you have maximum concentrations. So that's one problem. The other

problem is that it really doesn't give you information on turbulent intensity.

Now having said that, as I said before, I will acknowledge there's no question that when that air comes to the, to the queue, that you're going to have enhanced turbulence because of the increased surface roughness. So that, I'm not arguing with that, and it probably reaches up to the stack pipe, which is the tailpipe, which is low. But I'm calling into question the use of something that without, without describing the qualifications that the author uses. To me that's, I would hope to do it differently if it were me, let's put it that way.

BY MS. ROSENFELD:

Q If you, I think I heard you say that you can't make a numeric judgment on the appropriate dispersion coefficients, is that correct? You, you're not --

A It's hard to do --

Q -- opining on that?

A -- because you've got a lot going on here. You could go either way. I think I recommended a long time ago that, you know, you could use a 50/50, a halfway measure. But I think that --

Q And a halfway measure between what and what, just so the record is clear?

A Between rural and urban dispersion. I took that

position which seemed to be something that, in his November report that Mr. Sullivan, that was his idea actually, intermediate value. He said it would fall between, the dispersion would fall between the two is what he said in the November report.

So I think the key point though is if you're going to invoke increased roughness, as Mr. Sullivan did in his testimony, increase the larger obstacles, all these cars. Some of the cars are moving, some of the cars are not. If you have enhanced turbulence, then you have to look at the other impacts of enhanced turbulence. You have to look at the decrease in speed which affects, inversely affects concentrations and, secondly, you have to look at the effect that that enhanced mixing, as I said before, has on the rate of reaction between NO and ozone. So I don't think you can do an analysis like this without looking at all the implications.

Q So in your opinion does that have an effect or qualify somehow the .25 cap on NO, NO2 in the 40 meter queue?

A The .25 can.

Q Yeah.

A Yeah.

Q Does this have an effect on --

A Yes, I would --

Q -- that analysis?

A I, given the amount of turbulence that we can expect with the roughness surface that, and that Mr. Sullivan has talked about due to these cars and everything, I don't think you can talk about that without looking at the enhanced mixing and the fact that you would, are likely to get ozone reaction, the ambient ozone coming into molecular contact with the NO much faster than he shows with these Powerpoint plumes, which are not subject to these, particularly under stable conditions they're not going to be subjected to that level of mixing with the atmosphere. I showed a photograph of that.

Q And as I understand it, in both stage 2 and stage 3, he has said that there will be no, none of that chemical mixing within the tailpipe box, correct?

A Yes, the tailpipe box, just let's be clear about it, it's pretty big because it extends about 130 feet in all directions from the queue and loading dock. So, that encompasses a pretty good chunk of area to say that you're not going to have any contact between ozone and NO is just, I don't agree with it.

Q So, so --

A I think the evidence is to the contrary.

Q So in your opinion will there be that chemical mixing within the tailpipe box above and beyond the .25 --

A Yes, I do. I think there will.

Q -- tailpipe emission?

A And I also note that in making his case, and this is important, that Mr. Sullivan uses Environmental Agency report and he comes to his conclusion about not insufficient time to get down to the molecular level mixing. But the Environment Agency as part of this report states the following.

MR. GROSSMAN: This is the EA, not the EPA, right?

THE WITNESS: This is EA.

MR. GROSSMAN: Right. I just wanted -- you're saying Environmental Agency. I don't want the --

THE WITNESS: Oh, okay.

MR. GROSSMAN: -- record --

THE WITNESS: Right. Right. Right. This is not U.S. EPA, this is --

MR. GROSSMAN: Right.

THE WITNESS: -- England and Wales, I believe.

MR. GROSSMAN: Right. Okay.

THE WITNESS: So here's a quote. I hope I have the, yes, page 43 of that report which has been submitted to the record. Some operators have used the method of Janssen, which was developed using aircraft data from plumes from large power stations, but the Environment Agency has rejected this for use on smaller plumes. So I think if

you're going to invoke a method and a document that endorses a certain method, there's a responsibility to report the caveat. And there's a very strong caveat here they say we don't approve of that.

BY MS. ROSENFELD:

Q Okay. Just very briefly. How do power plant plumes and tailpipe emissions affect ground level receptors differently?

MR. GROSSMAN: I think he's already testified to that and showed pictures of it and testified about --

THE WITNESS: I have one more picture that I didn't show.

MR. GROSSMAN: Okay. I mean I think we've had a lot of pluming evidence here. I think I understand this point.

MR. SILVERMAN: A plethora of plumes.

THE WITNESS: Where are those slides? Right here. Let's see. Okay. I don't know why, but it's a plume that contrasts a power plant.

MR. GROSSMAN: Which page? Which side?

THE WITNESS: Michele?

MS. ADELMAN: 11.

MS. ROSENFELD: I do not have a copy of the slides any longer.

MR. GROSSMAN: You've already referenced 11.

MS. ROSENFELD: 13.

MR. GROSSMAN: Okay. Okay.

THE WITNESS: So I'm, I'm trying to show here two things. One is the dispersion that's, that's affected by so close to the surface compared to the power plant. And, secondly, that the, without getting into health effects, we know that there are people who pass in close proximity to these plumes.

MR. GROSSMAN: Okay.

MS. ROSENFELD: I'm looking for copies of the exhibit that Mr. Goecke handed out before that hearing. It had a bunch of dots on it. I seemed to have misplaced my stack.

MR. GROSSMAN: A bunch of dots exhibit?

MS. ROSENFELD: A bunch of dots exhibit, yes, that. Do you remember what number that is? Did you take one?

MR. GROSSMAN: This is the nationwide monitoring inventory?

THE WITNESS: 593, it says.

MS. ROSENFELD: Yes, Exhibit No. 593.

MR. GROSSMAN: Hold on. I've go to go through my pages here to get down to it. I'm sure I have a copy in here somewhere.

(Discussion off the record.)

MR. GROSSMAN: All right. Well --

BY MS. ROSENFELD:

Q I believe this exhibit was entered into the record to suggest that the highest NO2 levels don't exceed EPA standards. And my question for you is how do you read this document? And if that's the conclusion that you draw, do you agree with it?

MR. GROSSMAN: What's the exhibit number on it again?

MS. ROSENFELD: 593.

MR. GOECKE: 593.

MR. GROSSMAN: 593? Okay.

THE WITNESS: Okay. So what Mr. Sullivan has shown is the distribution of points which represent 411 reporting sites, monitors for one hour NO2 and he's, he's looking here only at the 98th percentile monitor values. So this -- it's not all of the readings, but it does relate, as Mr. Sullivan states, to the standard because the standard is based on one hour, 98th percentile.

MR. GROSSMAN: Right.

THE WITNESS: So fair enough. He shows two things on this diagram that, all of these points are below the 100 level standard and, secondly, that his modeling stage 1, 2, and 3 are sort of in line with the upper end of, of these concentrations. That's what this shows. Now in my --

MR. GROSSMAN: However, you referred to 100, the standard --

THE WITNESS: I'm sorry.

MR. GROSSMAN: -- 100 parts per billion?

THE WITNESS: Yes, I'm sorry. That's 100, approximately 190 micrograms per cubic meter. This is in parts per billion, so --

MR. GROSSMAN: Right.

THE WITNESS: -- the standard is 100.

MR. GROSSMAN: NO2 one hour?

THE WITNESS: Yes. So here's the problem I have with this NO2 is it's several, one is that we've, the opponents have presented a great deal of testimony about, A, the level of traffic and, B, the level of congestion in and around the gas station, which includes idling cars, queues, the ring road, back-ups at certain peak hours and in my judgment this is a unique site that may not be reflected in the distribution of monitors shown here in this exhibit.

MR. GROSSMAN: Well, what Mr. Sullivan testified to, if I recall, in his rebuttal testimony was that some of these monitors are right next to a super highways, or at least one of them, as I recall. Are you suggesting that what you'd characterize as a unique situation here might have a higher --

THE WITNESS: Yeah.

MR. GROSSMAN: -- NO2 one-hour reading than adjacent to a super highway?
THE WITNESS: Well, first of all, most of these sites, I have to say that the overwhelming majority of these sites are not near roadways and that's a whole other issue because EPA as part of its standard recognized this problem and has required the addition of hundreds of monitoring sites to better reflect roadway concentrations.
MR. GROSSMAN: I understand, but I'm just saying if we look at the very highest monitoring sites reported on this, on this exhibit nationwide for NO2 one hour, 98th percentile values, what he's saying is that they're lower than his projection in stage, stages 1 and 2 --
THE WITNESS: Uh-huh.
MR. GROSSMAN: -- and some of them a little higher than a stage 3. But in any event, I think that's his point. Are you suggesting that this particular area that is a subject would produce greater one hour NO2 readings than a, he suggested, a congested super highway?
THE WITNESS: Well, I'm not sure this data represents a large number of congested highways.
MR. GROSSMAN: Well, it doesn't have to be a large number. If none of them, if even one of them is next to a congested super highway and still has a lower reading, I think that was the point he was making. I'm not adopting it

or rejecting it. I'm just asking you is that your opinion that this subject site could produce or is, I don't know what to say, could produce or is likely to produce one hour NO2 readings above that which is registered in, right next to a congested super highway? That's the question. Because a lot of these, I mean he's just saying, he's saying he has a lot of readings here, a lot of monitors, but the ones that are, I guess are the most directly of concern here would be the highest readings that anybody has taken in any monitor nationwide, assuming that he has accurately included all of the, the individual monitoring stations in the United States.
THE WITNESS: So the point I would make is that in order to demonstrate the validity of this kind of analysis and its applicability to the particular site, you would have to show that some of these sites are, in fact, in the area of a mega gas station with queues, with ring roads, with congestion, with back-ups, considering the non-linear or synergistic effect of increased traffic and lowering of vehicle speeds. Also, there's another unique factor about this that really hasn't been addressed which is that this particular site has a building to the north, a building to the east, and a proposed wall to the south. Now, what impact do those features have on wind speed, on circulation?
MR. GROSSMAN: Well, I think we have to go back to

that.
THE WITNESS: What I'm saying is, well, I'm going back to your point --
MR. GROSSMAN: April and May he did do a terrain analysis that's in there.
THE WITNESS: That was a totally different issue.
MR. GROSSMAN: Okay.
THE WITNESS: Totally different issue.
MR. GROSSMAN: He was asked specifically --
THE WITNESS: He has not considered --
MR. GROSSMAN: -- about, he was asked, let me finish, he was asked specifically about the effect of the wall and so on. So he was asked questions that pertained to that. So I don't think that it --
THE WITNESS: Yes, and he couldn't provide an answer.
MR. GROSSMAN: No, but I don't think we can, well, you can argue one or the other.
THE WITNESS: He didn't because, well, you want to discuss this? Hold on.
MR. GROSSMAN: Okay.
THE WITNESS: I'm sorry.
MR. GROSSMAN: You can argue with what he said, but, but he provided an analysis of air turbulence and terrain analysis on the site. One can argue, and you can

argue about it, and you can testify about it. All I'm saying is that it's -- I don't think you can say accurately it hasn't been addressed, but I take it from your answer, you didn't directly say this, but you tell me if I'm correctly giving your answer to my question. And your answer, if I understand you correctly is, yes, this subject site with all of its peculiarities could result in an NO2 one hour reading above what is being, has been monitored adjacent to a congested super highway, that's what you're answering? And if I got you wrong, you tell me, but I'm trying to --
THE WITNESS: Yes.
MR. GROSSMAN: -- because that's my question and you didn't answer my question directly, but I'm trying to --
THE WITNESS: But --
MR. GROSSMAN: -- trying to reach a bottom line from what you've said.
THE WITNESS: There's a premise, I think, in your question and that premise in my opinion is that, in fact, there's a representative number of those particular situations in this data.
MR. GROSSMAN: I'm just going by what Mr. Sullivan testified, that at least one of those monitors, and maybe more of them, but at least one of those monitors is next to a congested super highway and I suspect there may be more

than one, but if that's the case, if we take that as the case, are you still saying that the proposed gas station at the subject site could result in one hour NO2 use exceeding that level?

THE WITNESS: Yes, I think it could.

MR. GROSSMAN: Okay. That was hard, harder than it needed to be. Okay.

BY MS. ROSENFELD:

Q Did you review the terrain analysis that Mr. Sullivan provided earlier in this case?

A You're talking about the slope analysis?

Q Correct.

A Yes, I did.

Q And do you remember if that slope analysis included the effect of a wall?

A We talked about that. I suggested that they use cow puff, which he did, however, one of the problems was that he, which is acknowledged in one of his reports, I can't remember which, that the mesh or the grid size for the cow puff was a 40 meter grid and he said that was too coarse to see the effect of the wall. He, I, I do not recall any presentation of data in any of these reports which specifically focused on the impact of the wall or I might add to that of the buildings to the north and the east. So it's a complicated situation because he's got like a

northeast wind with some of his maximum concentrations and that would be an air flow that passes over buildings and then may come down or may ride over the building, depending upon the stability, the stratification. But we don't see that addressed.

Now I, I recognize that that's a hard thing to do in modeling and there are different ways to do it, but to me that speaks to the need for conservatism and it speaks to the, to the need to if you're going to show a diagram like this and you're going to use it as evidence for this particular site, I believe that to be valid you would have to compare apples with apples. You would have to say, okay, here's a similar site, we have the monitoring and here's what it shows. Now --

MR. GROSSMAN: You determined a diagram like this? You're referring, when you said that, to Exhibit 593?

THE WITNESS: Yes.

MR. GROSSMAN: Okay.

THE WITNESS: So now let me add something to this. It's very clear from the record, from EPA's discussion both in the standard and in technical documents related to the standard that they're requiring additional sites. And the reason for that is they felt that these, these values that they were getting reflected more of a generalized condition. And part of that, you know, is because the concern has

really been about ozone for decades and less so with NO2. So when you collate these, when you co-locate sites, you may go to places where there are ozone monitors and, in fact, it's important to have the two together, but those ozone monitors are generally aimed at looking at regional concentrations of ozone because ozone doesn't vary as much in the region, as much as NO2 does. NO2 has very sharp gradiance, and that's why it's necessary, in EPA's and my estimation that you have more of these sites near highly trafficked areas. And those sites are just being installed now and they are not reflected in this data. This is 2013. So --

MR. GROSSMAN: Mr. Brann, would you check our thermostat again please? And whatever it is, please lower it. Thank you.

BY MS. ROSENFELD:

Q So do you have an opinion as to whether or not data from those new monitors might reflect different levels, different concentrations of NO2?

A I can't, I'm having, because of the ventilation --

Q Do you, do you have an opinion as to whether or not when the new data from the new near road monitors comes in, whether it might affect the level, the concentrations of NO2 that we see here on Exhibit 593?

MR. GROSSMAN: I'm going to stop you on that,

because now you're asking him to speculate on something. I have no problem with a hypothetical to an expert based on facts that are in evidence or you're going to put in evidence, but when you're asking him do I have the same idea of whether they're going to do one thing or another when they come in, I think that's problematic as a question.

MR. SILVERMAN: There's evidence in the record.

MR. GROSSMAN: Pardon?

MR. SILVERMAN: There's evidence in the record that's suggestive of allowing an informed person to make a judgment.

MR. GROSSMAN: There's evidence in the record that would make an informed person to make a judgment on what?

MR. SILVERMAN: On, on what, what the levels would be when the monitoring system is in place.

MR. GROSSMAN: I think that's --

THE WITNESS: I'll stick to what I said.

MR. GROSSMAN: With the body of evidence that we have here, I really try to avoid speculation. It's just not necessary.

THE WITNESS: I can give you one non-speculative --

MR. GROSSMAN: Well, go ahead, non-speculative.

THE WITNESS: Right. That what I did when I saw this was I --

MR. GROSSMAN: This being Exhibit 593?
THE WITNESS: Yes, I'm sorry. I went back to the data which is referenced here at the bottom --
MR. GROSSMAN: Yes.
THE WITNESS: -- and looked at all of the hours, not just the 98th percentile.
MR. GROSSMAN: Yes.
THE WITNESS: And there were not a lot, but five or six values that were above 100 parts per billion. Now I acknowledge that that's not the way the standard, that those would not be included in the standard, but it is evidence that higher values are possible and I would suggest that locating things, locating monitors, NO2, one hour monitors in more highly trafficked areas would tend to show more of these points at or beyond the red line.
MR. GROSSMAN: Okay. Your witness nicely got around my question, my --
THE WITNESS: He did.
MR. GROSSMAN: -- my objection.
THE WITNESS: It's not a red line? I'm color blind.
BY MS. ROSENFELD:
Q And going back to the, the Sonoma study that we discussed earlier, Table 3-3, on page 318, which reflect near road monitors --

MR. GROSSMAN: That's Exhibit --
MS. ROSENFELD: -- near road monitor readings.
MR. GROSSMAN: -- 602?
MS. ROSENFELD: Yes.
MR. GROSSMAN: Can you, and --
BY MS. ROSENFELD:
Q Do those, do those readings --
A I'm trying to find --
Q -- provide you with any additional information?
MR. GROSSMAN: You're on page 3-3?
MS. ROSENFELD: Table 3-3 on page 318.
MR. GROSSMAN: Okay.
THE WITNESS: This is the STI Sonoma, Table what?
MR. GROSSMAN: It's Table 3-3 on page 3-18.
THE WITNESS: Well, this doesn't relate directly to the issue of the level of NO2, it relates to the NO2 to NOX ratio.
MS. ROSENFELD: Okay.
THE WITNESS: So I don't think this has a, has, necessarily has a bearing except that to show that conversion takes place, can take place very near to trafficking areas.
BY MS. ROSENFELD:
Q Okay. Dr. Cole, we've spent a good bit of time talking about Mobile 6 versus Moves and proper conversion.

A Right.
Q Or scaling factors --
A Right.
Q -- as between those two models. Does Mr. Sullivan address Moves v. Mobile 6 in his rebuttal report and have you reviewed that analysis and do you have an opinion as to how he treated it?
A Yes, I do.
MR. GROSSMAN: Well, now you asked two questions, so I'm not sure what the yes is in response to.
THE WITNESS: Okay.
MR. GROSSMAN: Did Mr. Sullivan --
MS. ROSENFELD: Did --
MR. GROSSMAN: -- address the Moves v. Mobile 6 issue in his rebuttal report?
THE WITNESS: He did.
MR. GROSSMAN: All right. And do you have an opinion regarding his analysis?
THE WITNESS: I do.
MR. GROSSMAN: All right.
THE WITNESS: I can't accept it as valid for a number of reasons.
MS. ROSENFELD: Okay. Could you speak up?
THE WITNESS: Okay.
MS. ROSENFELD: Thanks.

THE WITNESS: Number one is that the study from which he draws this, his conclusion. And his graph, his graph shows that at very low speeds that Mobile 6 has concentrations which are higher than Moves, which is different from the evidence that, certainly that I put into the record and different from information provided by the Federal Highway Administration.
MR. GROSSMAN: Well, just so we know what we're talking about here, you're talking about NO2 now, right, as opposed to PM 2.5?
THE WITNESS: We're talking about NOX.
MR. GROSSMAN: Oh, NOX, okay.
THE WITNESS: Emissions. We're talking about now, I'm sorry, not to frame it, but --
MR. GROSSMAN: Right. I just want to make sure you, that because we had different, we had different analyses with respect to Moves v. Mobile 6, depending on whether we're talking about PM 2.5 or we're talking about NOX. So I wanted to make sure what you're referring to.
THE WITNESS: Okay. I'm referring to NOX --
MR. GROSSMAN: Okay.
THE WITNESS: -- emissions. And Mobile 6, which is no longer an approved model, versus Moves, which is EPA since 2010 at least has been the official regulatory model for emissions. So Mr. Sullivan, as we know, used Mobile 6

and evidence that I put into the record previously was the Federal Highway Administration report. It was Quagit (phonetic sp.), the Quagit report. It showed the opposite. It was Quagit 2010.

And for NOX, it showed that at those low speeds, Moves gave values of emissions of NOX twice those, roughly twice those of Mobile 6. Now --

MR. GROSSMAN: What about the distinction he makes, fleet mix versus solely gasoline vehicles, because the gas station queues, the gas station is not proposed to sell diesel fuel, so it will only have, it will only have cars queuing that are gasoline --

THE WITNESS: Well, I --

MR. GROSSMAN: -- cars?

THE WITNESS: I think you could show that the loading dock is part of the fleet and there are trucks --

MR. GROSSMAN: The loading dock is not, well, I mean it factors in here, but not as part of the gas station per say, okay?

THE WITNESS: So one issue is whether we can trust this particular report which purports to separate out vehicles by type.

MR. GROSSMAN: Uh-huh.

THE WITNESS: And --

MR. GROSSMAN: That's the Appendix E, that's a

report in Appendix E at page 41 of the Sullivan rebuttal which is Exhibit 466, is that correct? Is this 461 or is it, I can't remember, 466? I couldn't read my own handwriting. What a shock.

THE WITNESS: Yes, there you're referring to the one I've labeled here as the Ozguven or Ozguven. Let's see what -- this report was produced by a civil engineer professor and his post-doctoral student at Rutgers University. It was not produced by U.S. EPA, number one. It was not produced by a state agency. It was not something that was published or peer reviewed. And I'm troubled because if you look at the figures, and I've put this on my slides, there's a lot of issues about the way these graphs are labeled and both in terms of the kind of vehicle that's being monitored, but also the particular pollutant that's being monitored. And I can show that in the -- do we have the slides somewhere?

MR. GROSSMAN: Your slides?

THE WITNESS: Yes.

MR. GROSSMAN: That's Exhibit --

THE WITNESS: Do you have a copy --

MR. GROSSMAN: -- 581.

THE WITNESS: I seemed to have lost everything that I -- here it is. I've got it. I'm sorry.

MR. GROSSMAN: Which side are you referring?

THE WITNESS: Okay. That's Slide 15 --

MR. GROSSMAN: Okay.

THE WITNESS: -- shows, and the issue is here that for the first time Mr. Sullivan applies a scaling factor to get from Mobile to Moves.

MR. GROSSMAN: Right.

THE WITNESS: He previously acknowledged that he hadn't done any correction factors in his earlier reports.

MR. GROSSMAN: I don't think that's correct. I think that he testified that he used the 10 times factor for PM 2.5 upgrade from Mobile 6 --

THE WITNESS: That's correct.

MR. GROSSMAN: -- to Moves and I think he doubled it for --

THE WITNESS: Well --

MR. GROSSMAN: -- if I recollect, maybe I'm recalling correctly, I guess I'll look back at the testimony and see. Well, he --

THE WITNESS: Well, specifically he testified --

MR. GROSSMAN: -- well, let me, let me finish --

THE WITNESS: Okay.

MR. GROSSMAN: I thought he testified that he doubled it or he took into consideration, I forget how he took into consideration exactly that the Moves model showed twice the level of NOX as the Mobile 6 one, but in this

report, of course, in the rebuttal report, he analyzed it further.

THE WITNESS: Okay. So my recollection is, which is different than yours --

MR. GROSSMAN: Right.

THE WITNESS: -- is that he testified, I believe it was on September 20th, that he had, that he agreed with the factor of two difference --

MR. GROSSMAN: Yes.

THE WITNESS: -- but that he did not include that in his modeling.

MR. GROSSMAN: You may be correct. I'll obviously review it when I --

THE WITNESS: So that's --

MR. GROSSMAN: -- review all the evidence.

THE WITNESS: Right. So suddenly when it comes to the rebuttal report, we now get a correction factor that rather than scale up the emissions, which he never did, and rather to stick to his original emissions, which he did in the previous reports, he now multiplies the emission factor by .7. He gets this from the figure that's shown on No. 15, page 15 of the slides.

MR. GROSSMAN: Right. He gets it from this, the --

THE WITNESS: Yes.

MR. GROSSMAN: -- based on the study --
THE WITNESS: The study.
MR. GROSSMAN: -- that we just discussed?
THE WITNESS: Yes, right. Okay. Fair enough. He shows Mobile 6 with a value of about 1.9, Moves with a factor of 1.3 at these low speeds.
Now here I mentioned some problems. If you look at the curve that's supposed to be passenger cars and you look at it, it's labeled buses underneath. Now that could be a, it's probably just a typographical error, that the one that's labeled buses, it has cars underneath.
BY MS. ROSENFELD:
Q Dr. Cole, which slide are you on?
A 16.
MR. GROSSMAN: I'm just wondering, where did your charts come from in Mr. Sullivan's --
THE WITNESS: That would be -- do we have that?
MS. ROSENFELD: They, they came from the Ozguven report.
MR. GROSSMAN: I see.
THE WITNESS: So that was one, one concern that, as I --
MR. GROSSMAN: So, I just want to understand what you're saying. You're saying that you took figures that were, these figures that you have on slides 15, 16 and 17

are directly from the Ozguven report?
THE WITNESS: Yes.
MR. GROSSMAN: Okay. Which I don't think itself is in the, in the record here --
MS. ROSENFELD: No, it's not.
MR. GROSSMAN: -- it's just the reference in Appendix 80 of the --
MS. ROSENFELD: Correct. If was referenced by --
MR. GROSSMAN: Okay.
MS. ROSENFELD: -- Mr. Sullivan.
MR. GROSSMAN: And so which of the, which is the, the chart that you say conflates incorrectly? Pardon my --
THE WITNESS: That is Figure 4.
MR. GROSSMAN: Figure 4? Okay.
THE WITNESS: Right.
MR. GROSSMAN: And let me see. So --
(Discussion off the record.)
MR. GROSSMAN: Oh, I see. This is a -- you're talking about the caption underneath the --
THE WITNESS: Yes.
MR. GROSSMAN: -- underneath.
THE WITNESS: The caption is different from the label.
MR. GROSSMAN: Right.
THE WITNESS: Now it could be that that's a

typographical error and, in fact, the proper labeling is given in the box rather than in the thing below.
MR. GROSSMAN: Right. Which is consistently color-coded --
THE WITNESS: Yes.
MR. GROSSMAN: -- and that is consistent throughout, so --
THE WITNESS: Yes.
MR. GROSSMAN: -- okay. All right.
THE WITNESS: The next problem is that if you look at Figure 6, which is supposed to be hydrocarbons, that's labeled NOX and it's identical to Figure 4, which is supposed to be labeled as NOX. So it --
MR. GROSSMAN: You're saying there's a labeling issue?
THE WITNESS: There's a labeling issue, but it, it speaks of a kind of, not attention to detail, but it makes me nervous about the entire report. And also the purpose of this report which was never, is not in any EPA guidance, it was a suggestion that they made at a conference of, gee, it's complicated to do Move 6. It's all this computer time and so we want to come up with a shortcut to get you from the old, obsolete model Moves to Mobile.
MR. GROSSMAN: Who said that? Who said that?
THE WITNESS: That's in the report, the objective

as they stated is to make things easier for agencies --
MR. GROSSMAN: Okay.
THE WITNESS: -- recognizing that Moves, while a more sophisticated tool that allows for more options and better represents actual conditions, is harder to use.
MR. GROSSMAN: Okay.
THE WITNESS: So they said then, well, let's come up with a tool that makes it easier, okay, and you can use, you know, you do what Mr. Sullivan does, use these tools --
MR. GROSSMAN: Okay.
THE WITNESS: -- to come up with a correction factor.
MR. GROSSMAN: Okay.
THE WITNESS: Now I have problems with this because it's not a sanctioned tool. It's at odds with the evidence that I presented in the Federal Highway Administration and it's also at odds with a study conducted by the Texas, the Texas, the --
MR. GROSSMAN: There's the magnifying glass.
THE WITNESS: It's by an agency that's similar to COG and it's, I'll give you the exact title here. But this is, this chart which is specific and I'll try to get this --
MR. GROSSMAN: That's not a scientific study, right?
THE WITNESS: What?

MR. GROSSMAN: The COG, whatever the equivalent, Texas COG study, you're not suggesting that's a scientific statement? You're saying it's, that, that the Appendix, Ozguven, what's the guy's name again, the --

MS. ROSENFELD: Ozguven.

MR. GROSSMAN: Ozguven report has been contradicted by evidence that you previously presented and by this Texas COG --

THE WITNESS: Right. Which shows just the opposite.

MR. GROSSMAN: Well, that was the question. Is the COG, a Texas COG report, is that a compilation of data or is that an analysis?

THE WITNESS: That's an analysis based on, I believe it's the Houston area. And it specific, they sorted it out specifically by passenger cars.

MR. GROSSMAN: And they found that Mobile 6 understated contrary to Ozguven understated NOX from passenger cars as a breakdown?

THE WITNESS: Correct. About a factor of, at low speeds, about a factor of a little more than two, which was similar to the result in the Federal Highway Administration report.

MR. GROSSMAN: And you're sure? Have you looked at that study and they didn't just base that on the evidence

that you previously supplied as to how to evaluate the comparison of Moves with Mobile 6?

THE WITNESS: As I can acknowledge, the, the Federal Highway Administration appears to reflect fleet averages --

MR. GROSSMAN: Well --

THE WITNESS: -- which Mr. Sullivan has said, well, that's different from motor vehicles in a queue, for example.

MR. GROSSMAN: I didn't make my question clear. I just want to know if your reference to the Texas COG study, is that reference based on your looking at the study and determining that, in fact, they have analyzed results and determined that cars produce by a factor of two less NO2 or that their, or that the, in other words, that the Mobile 6 understates it rather than overstates it for cars at slow speeds, or is it just based on them applying to a model the, the previous assumptions about the relationship between Mobile 6?

THE WITNESS: No, this is a different analysis based on a different examination of conditions in, in Texas --

MR. GROSSMAN: Okay. And I might add that since this is segregated by vehicle type --

MR. GROSSMAN: Right.

THE WITNESS: -- it clearly didn't come from the Federal Highway Administration which looks at the averages. But despite that, the two, the two are in line with one another.

Now let me, let me make the point that Mr. Sullivan had some choices. He, when the evidence seemed to show that NOX from Moves was twice as high as for Mobile, he didn't, did not apply that. He acknowledged that in his testimony, but he didn't apply it. Then it comes to this rebuttal report and suddenly he's coming up with a reduction factor, another retreat from conservatism based on an unpublished study that is not referenced in any EPA manual on emissions that I've seen and is contradicted by other evidence.

So one of his choices might have been to just not use a scaling factor. So it's, it's interesting to me that when he wants to reduce concentration, suddenly there's a negative scaling factor, a scale down factor, but I, I would say that this, this evidence at this point is such that he should have just, if he didn't want to use a scaling factor, don't use a scaling factor. But for goodness sakes, don't cherry-pick the literature and use a scale-down factor when there's no real basis for it in the guidance.

MR. GROSSMAN: Now I, I don't have a basis for whether he cherry-picked the literature or not, but I do

question when you say that it's inconsistent, putting aside the Texas COG study for a second, if, in fact, the other figures that you gave were based on fleet averages and didn't look at the breakdown between cars and other vehicles, is it accurate to say that that is inconsistent with the, with the studies cited by Mr. Sullivan which looked at something different, looked at a breakdown? I don't know if they're inconsistent. They may be, it may be that had the Federal Government looked at the breakdown, it would have come to the same conclusion. I'm just saying that they're looking at, one is looking at the whole and another is looking at the parts of it. So I just wonder whether you say, you can legitimately say they're inconsistent?

THE WITNESS: Well, he picked --

MR. GROSSMAN: It doesn't really matter to me.

THE WITNESS: All right. So --

MR. GROSSMAN: Inconsistent or not --

THE WITNESS: We have two experts going over this issue, so he comes up with one study, I come up with another study. This is exactly why EPA has -- when you depart from guidance, they want justification and they want to be part of the -- they want to observe that process because it, you can, let me tell you that --

MR. GROSSMAN: And that's exactly why we have

dueling experts and extensive cross-examination and plenty of time for people to come up with studies as part of this process.

THE WITNESS: Okay.

MR. GROSSMAN: So they each have their ways of, of producing some approximation of truth. All right. Go ahead. I've finished.

BY MS. ROSENFELD:

Q For the record, what, what does the acronym COG stand for?

A Council of Government.

Q So the Texas study that you're referencing?

A This is, print is so small. I apologize, but --

Q But it was a Government-sponsored study?

A It is a -- this is, the Moves model, I said Houston. From the Moves model, Dallas Fort Worth, Texas area case study. So north, Council of Government, and it says North Central Texas, I believe, Council of Government. So that would fit the Dallas/Fort Worth area.

MR. GROSSMAN: Do we have a copy of that?

MS. ROSENFELD: There are excerpts in the slides. I don't have a full copy of the report.

MR. GOECKE: So you have not produced a copy of this report, have you?

MS. ROSENFELD: I don't recall, if was in --

THE WITNESS: We can do that.

MS. ROSENFELD: -- the prior submissions. I don't have a copy with me today.

MR. GOECKE: Is this, is this the document referring to you, Dr. Cole?

THE WITNESS: I believe that's it, yes. That's the document.

MR. GROSSMAN: May I see that, Mr. Goecke? Can you read to me what the name is on here for the record?

MR. GOECKE: Can I?

MR. GROSSMAN: Yes.

MR. GOECKE: Are you putting me on the spot? Madhussudhan Venugopal.

MR. GROSSMAN: Okay. You got that? All right. I know that's Central Texas Council Government.

THE WITNESS: Well, may I, may I just add a footnote to the name? It's Nolastrangenobgood (phonetic sp.).

MR. GROSSMAN: I'm not making fun of the name, I just had a problem pronouncing it. All right.

THE WITNESS: There are a lot of good tech people that come from other places.

MR. GROSSMAN: I'm sure. Hold on a second. Mr. Goecke, can I make this a part of the record or is this your only copy or --

MR. GOECKE: That is our only copy, that I know of.

MR. GROSSMAN: Do you have a copy --

MS. ROSENFELD: I do not. We don't, no.

MR. GOECKE: This is the one we found on our own. It wasn't provided before. I mean, our concern with that is it's merely a Powerpoint presentation, it's not an actual report. So --

MR. GROSSMAN: That was what my question was going to, what kind of a study was this? Was this is a, was it Council of Government? Could this mean somebody didn't prepare the study? I see something here called Moves converter. What does that mean? I just wondered whether they just did a conversion factor based on the previous factors that you had testified about and did a two to one conversion factor and that's how they got Mobile 6 figures versus, versus Moves. That's why I was questioning you about this, as to whether or not this actually was the same kind of study of the, as the one cited by Mr. Sullivan.

THE WITNESS: So my --

MR. GROSSMAN: You can take --

THE WITNESS: -- my judgment --

MR. GROSSMAN: I'd love to just mark this.

MR. GOECKE: I would, too.

MR. GROSSMAN: Okay. Let's, let's, let's mark

this and then we can see, so we have something noteworthy referring to. This will be Exhibit 603. It is called emissions, emission inventory, inventories development using Moves model, a Dallas-Fort Worth, Texas area case study and North Central Texas COG. And this will be Exhibit 603.

(Exhibit No. 603 was marked for identification.)

MR. SILVERMAN: Mr. Grossman, just maybe it would be helpful to remember that Mr. Sullivan, his reason for not using the Moves was because he hadn't heard from the Council of Government on their values, that the Council of Government played a role.

MR. GROSSMAN: I recall that.

MR. SILVERMAN: Thank you.

MR. GOECKE: All right. But just for the record, this is a different Council of Government.

MR. GROSSMAN: Right. Right.

MS. ROSENFELD: Yes.

MR. GROSSMAN: Right. Yes. Now let me show you Exhibit 603. Mr. Cole, and can you tell from looking at Exhibit 603, because that's the study you have been discussing, can you tell whether or not, how they got their various figures for cars for Moves versus Mobile 6?

THE WITNESS: Well, if you look at the first couple of tables, you'll see that they use each, they have

Mobile 6 classifications and Moves source types and the second one gives you the units for each that are, that come out of the model.

MR. GOECKE: Mr. Grossman, can we make copies of this so that we would have time to review it?

MR. GROSSMAN: We'll take a break. We'll take a five minute break and my staff can make a copy of it. So we'll make one, two, three, four copies.

(Whereupon, at 2:53 p.m., a brief recess was taken.)

MR. GROSSMAN: That's it. You were the one. All right.

MR. BRANN: I think that was intended for us. David gave that to Mr. Cole.

MR. GROSSMAN: Okay. Well, I have one I can use.

MR. BRANN: Thank you.

MR. GROSSMAN: I'm doing that, so that's fine. Okay. So I think where we left off, I was asking -- and we're back on the record. I was asking Dr. Cole if he can tell from looking at the study how they came to their figures for Mobile 6 for cars versus Moves 2010.

THE WITNESS: Well, in my judgment the model using both --

MR. GROSSMAN: Wait, on each model separately?

THE WITNESS: -- each one and then --

MR. GROSSMAN: And compared the numbers?

THE WITNESS: Compared the numbers.

MR. GROSSMAN: Okay. All right.

THE WITNESS: And they segregated by vehicle class.

MR. GROSSMAN: Okay. So I don't have any other questions in this one. Okay. Ms. Rosenfeld.

MS. ROSENFELD: Yes. Thank you.

BY MS. ROSENFELD:

Q And Dr. Cole, one more question on Exhibit 603. It's the Texas study. In your opinion, is that, is that study a reliable study?

A Well, given the level of detail that I see here, I don't think, see anything that, let's put it this way, that, that makes me suspicious. On the other hand, I want to come back to my point which is --

MR. GROSSMAN: Well, there's not a question pending, so let's not come back to a point that's any other --

THE WITNESS: Can you ask me if I --

MR. GROSSMAN: You don't have to reiterate anything. We, believe me, I've been attentive. Even though our copier machine had a sleep time I'm told before it was awakened, but the Hearing Examiner has tried to stay awake.

BY MS. ROSENFELD:

Q Dr. Cole, I have a couple questions for you about Exhibit 567, which is the CAPCOA guidance document. And I am going to refer you to Appendix A, page 33. And on Appendix A, page 33 --

A Uh-huh.

Q -- there is a table that lists a hierarchy of 11 different ways to model certain emissions. Do you see that table?

A I do, yes.

Q And is stage 2 as shown, as reflected in Mr. Sullivan's rebuttal report, reflected in any of those 11?

A Stage 2 you say?

Q Stage 2, do you see that reflected anywhere?

A Yeah, stage 2 would be No. 11 because it used parent matching.

Q And as you go from the first to the 11th modeling system shown there, do you go from less conservative to more conservative or more to less?

A This is less conservative to more conservative, I'm sorry, it goes from more conservative, number one, down to number 11, which is the least conservative.

Q And is there any particular caveat to number 11 that's unique to that level of analysis?

A Well, it says may use with the approval of the reviewing agency.

Q And is there any other level of analysis that has that caveat?

A No.

Q Okay. In your opinion, is stage 2 analysis is reflected in the rebuttal report reasonably reliable as an indicator of conformance to the NAAQS?

A Say that again, please.

Q Is stage 2 --

A As --

Q -- shown in the rebuttal report --

A Okay.

Q -- reasonably reliable as an indicator of conformance to the NAAQS, stage 2 NAAQS?

A I don't believe it is.

Q And you've gone through in some detail your areas in which you disagree with Mr. Sullivan's approach. Could you just briefly highlight those?

A Yes. We can start with the parent matching modeling and monitoring hour by hour. I think that's not at all conservative and EPA guidance cautions against its use. Secondly, I'm very concerned about these, the no ozone, the 40 meter perimeter around the queue, there being no ozone conversion of NO to NO2. I think that's not been at all shown to be the case and is at odds with guidance.

Another would be the equation of what happens in a

power plant plume in terms of mixing, comparing that, those, that data and those, the evidence on the rate of down to molecular mixing in an elevated power plant plume versus what's happening at the surface, particularly in areas where there's likely to be a lot of turbulence and mixing as Mr. Sullivan has testified.

I talked about the fact that he introduces in his rebuttal report a scaled down version to go from Mobile 6 to Moves. I see no precedence or mention of that kind of analysis in the guidance, his arbitrary capping of in stage 3.

Q Well, let's stick with stage 2 for the moment.

A Okay. Oh, you're talking about stage 2? Okay.

Q In, in your opinion, will the NO2 levels exceed the next if stage 2 were, under the stage 2 analysis?

MR. GOECKE: Objection. Speculation. Under whose stage 2 analysis?

MR. GROSSMAN: And I'm not sure what you're exactly asking because it was Mr. Sullivan who did the stage 2 analysis. I don't understand what your question means.

MS. ROSENFELD: Let me --

MR. GROSSMAN: I don't understand what you're asking.

MS. ROSENFELD: I'll retract the question --

MR. GROSSMAN: Okay.

MS. ROSENFELD: -- and ask it differently.

BY MS. ROSENFELD:

Q In your opinion, had the issues that you just outlined, the modeling concerns that you raised been properly applied, would stage 2 reflect NO2 levels that are below or above the NAAQS?

MR. GOECKE: Objection. There's been no testimony that he's done any calculations applying the, the assumptions the way he thinks they should be applied.

MR. GROSSMAN: I think he can answer that hypothetical question. So I'll overrule that objection.

THE WITNESS: My preliminary examination shows that in all likelihood if you look at the, all of the factors I just mentioned, and perhaps some that I haven't, that those will increase if those were handled in a conservative fashion in line with EPA guidance that there is a greater likelihood that the outcome would show a maximum level above the national ambient air quality standard one hour NO2. I stated that as a, as a scientist that there is a significant likelihood or probability. I'm not prepared to answer in absolute.

BY MS. ROSENFELD:

Q And in your opinion, is the stage 3 analysis as reflected in the rebuttal report reasonably reliable as the indicator of conformance to the National Ambient Air Quality

Standards for one hour NO2?

A Well, in my judgment that's the least reliable and departs the furthest from any of EPA's recommendations or default options and is, in fact, at odds with the guidance.

MR. GROSSMAN: Did you do that for stage 2 or 3?

THE WITNESS: Three, she said.

MR. GROSSMAN: Three? Okay.

THE WITNESS: Stage three, right?

MR. GOECKE: Yeah.

THE WITNESS: Yeah.

MR. GROSSMAN: Well, let's not leave out stage 1. What do you feel about stage 1 of the Sullivan analysis, the rebuttal analysis?

THE WITNESS: Well, it's conservative. It is an option, basically total conversion.

MR. GROSSMAN: Stage 1, not tier 1, by the way.

THE WITNESS: Oh, you're talking about stage 1?

MR. GROSSMAN: Yes.

THE WITNESS: Stage 1 is, I want to say it's identical, but it's, it's, in essence, EPA's tier 1, which says all of the NOX goes, is NO2.

MR. GROSSMAN: Uh-huh.

THE WITNESS: And that's what Mr. Sullivan's previous analyses is November, August, et cetera, use. So I, I think it's a bit conservative. I would be let's say

more comfortable with the tier 2, which is an 80 percent conversion.

MR. GROSSMAN: Okay.

BY MS. ROSENFELD:

Q And, Dr. Cole, when you testified at greater length about the stage 1 analysis during the course of your testimony, it was stage 1 analysis essentially included in all these 2013 report?

A Yes, it was, the text of the rebuttal report says we included this as a matter of, for the purpose of comparison, what it calls the more refined analyses, stage 2 and stage 3.

Q And earlier in this you've, you testified at some length about your concerns about the stage 1 analysis, is that correct?

A Yes.

Q And have you in your subsequent review of the rebuttal report read or reviewed anything that would cause you to retract any of the concerns that you've testified about earlier with respect to the stage 1 analysis?

A I would say I have a more nuanced position on the issue of total conversion as opposed to let's say an 80 percent rate or a, one of EPA's other default options, which is to say I don't think there's anything wrong with going to the OLM, but many of the mistakes are, many of the judgments

which I didn't agree with in the initial analyses, such as August 2013 would carry over. And then there are some additional concerns, such as the scale down factor.

MS. ROSENFELD: Now, Mr. Grossman, I have no further questions.

MR. GROSSMAN: Okay. Cross-examination? Well, I guess I'll, I'll, Mr. Silverman, do you have any cross-examination questions?

MR. SILVERMAN: No. If I did, I would have whispered them to Ms. Rosenfeld.

MR. GROSSMAN: And Ms. Duckett is not here, so that leaves the applicant.

CROSS-EXAMINATION

BY MR. GOECKE:

Q Dr. Cole, I'd like to start with your testimony regarding the hour-by-hour pared concentrations. It's my understanding that your testimony is that the EPA guidance only allows for that approach in one situation, is that correct?

A What do you mean by one situation?

Q Well, why don't you tell me? When does the EPA allow air modelers to use the hour-by-hour combined, you know, when they combine the modeling background and model concentration on the hour-by-hour basis?

A Well, it says, as I read previously, therefore, we

do not recommend such an approach except in rare cases of relatively isolated sources where the available monitor can be shown to be representative of the ambient concentration levels in the areas of maximum impact from the proposed source. That was one. Then it says another situation --

Q And right now you're reading from the Tyler Fox, March 2011?

A Page 21, yes, Exhibit 407. Another situation where such an approach may be justified is where the model of emission inventory clearly represents the majority of emissions that could potentially contribute to the cumulative impact assessment. And it repeats then, except in rare cases of relatively isolated sources, a single ambient monitor or even a few monitors will not adequately be representative of hourly concentrations across the model domain.

Q Well, you skipped a portion of the paragraph, but my point is exactly that earlier today you testified about rare cases of relatively isolated sources when in reality the Tyler Fox guidance says another situation where such an approach may be justified is where the modeled emission inventory clearly represents the majority of emissions that could potentially contribute to the cumulative impact assessment and where inclusion of a monitored background concentration is intended to conservatively represent the

potential contribution from minor sources and natural or regional background levels not reflected in the model inventory. Did I read that correctly?

A Yes, I think so.

Q And you did not testify about that other situation earlier today, did you?

A I testified that in my judgment the fact that the background concentrations were as high they were between 40 and 60 percent of the, of the model, of the concentrations, the maximum concentrations as shown in Figure, Figures 2 and 3 of the rebuttal report, but that's an indication that the source is not isolated.

Q Okay. Well, let's break this down one step at a time. My question to you was, earlier today when you testified, you said there was only one situation, rare cases of relatively isolated sources, but you neglected to talk about the other situation that Tyler Fox contemplates.

A I disagree with that. I, I, my testimony was applied. Maybe I didn't read that second piece. I'm not sure. You'll have to go back to the record. But Mr. Sullivan has not presented an analysis showing that he meets the criteria.

Q Okay. Well, let's talk about that. So is it your testimony that this other situation does not apply here?

A Yes.

Q Okay. And so with this other situation, it, when it may be justified is when the mild emission inventory, and what does that mean, mild emission inventory?

A That would be in this case Mr. Sullivan relied on Mobile 6 to produce vehicle emissions.

Q Isn't the mild emission inventory all in the sources that he's modeled?

A Yes.

Q Okay. And so when all the sources that he's modeled represent the majority of emissions that could have potentially contributed to the cumulative impact assessment. So the, the modeled emission inventory that Mr. Sullivan prepared, how does that compare to the background levels in terms of percentage of total cumulative concentrations?

A If I could ask you to repeat that, please?

Q Sure. Let's put it this way, the total model concentrations that Mr. Sullivan prepared, are they greater or less than the background levels?

A They're about half and half.

Q Okay. So, so if they're 51 percent, they're a majority?

A Well, in one case the background was 62 percent.

Q Okay. So if it's a majority, then it could potentially been this, I'm sorry, the hour-by-hour basis is appropriate?

A Yeah. And nor do I accept the premise that the background, the modeled area includes the gas station area, the queue, the ring road, the entrances and exits and parking and the area roadways. I am not conceding for a moment that, that that modeling grid incorporates all of the emissions that affect this neighborhood. So those are two lines of answer to your question. One is --

Q Okay. We'll talk about that in a second, but the first point I want to make with you is if the modeled emissions are a majority of the total impact, then, then it's appropriate to do the hour-by-hour comparison?

A Then you have to go, according to the guidance, you then have to make that case before EPA. They require -- any hour-by-hour matching without getting into the legality, the, if we were applying that standard here, you would have to discuss that with the regulatory authority because, because it's, as they point out, it's a very, very iffy situation to assume that the source receptor relationships under different wind conditions at a monitoring site, particularly one that's far away, will reflect the source receptor relationships at the site.

Q And so it doesn't say anything in the Tyler Fox memo about seeking the EPA guidance, does it? This is just your opinion?

A No, it's right in the guidance.

Q And point to me, point that out to me, where is that?

A You're talking about matching?

Q Yes.

A All right. I'm going to look in detail to see if they have specific requirements for approval for matching, but there's clear language that as you go to more, as you go to the hour-by-hour match, that the, as they say, the assumption clearly ignores the many factors that contribute to the temporal and spatial variability of ambient concentrations across a typical, therefore, we do not recommend such an approach except in rare cases.

But there's general language in this which doe, when you depart from default values that given the added complexity of technical issues that, this is page 11, last paragraph, that arise in the context of demonstrating compliance with the one-hour NO2 NAAQS fuel dispersion model, we strongly encourage adherence to the recommendations in Section 12.2.1 of Appendix W that every effort should be made by the regional office to be with all parties involved, either in a SIP revision or PSD permit. So that's one --

Q And this is neither a SIP revision or a PSD permit?

A Right. I understand that, and I was clear to

state that I'm not talking about the legal requirement here. What I'm talking about is the level of guidance, the level of supervision that is appropriate to the level of complexity and to the level of, to the level of uncertainty that's introduced by going to something like hour-by-hour paired matching. That is clearly stated here as a, something that they don't recommend without a great deal of justification.

Q Well, as I understand, one of your criticisms of Mr. Sullivan's testimony and his reports is that he should not have done the hour-by-hour compared matching in part because he did not get EPA approval, but given what you've read on page 11, you agree, don't you, that that was not applicable in this situation?

A No, I think --

Q He could not, he didn't have the option of going to the EPA?

MR. GROSSMAN: He, it doesn't matter what he answers. We know that he doesn't have the option of going to the EPA in this situation.

MR. GOECKE: Okay.

MR. GROSSMAN: It's not an issue. Did it switch back up again?

MR. BRANN: It did.

(Discussion off the record.)

BY MR. GOECKE:

Q Dr. Cole, I'd like to bring your attention to Exhibit 602 of the STI, Sonoma Technology report. Do you still have a copy of that in front of you?

A I do.

Q And if I understand you correctly, you're relying on this summary to support the position that the ratio between NO2 to NOX within 40 meters of the gas queues is higher than .5, is that correct?

A Can you refer me to the particular --

Q Sure. Yeah.

A -- guideline?

Q You said at Table 3-3, page 318.

A Okay. No, this, if I didn't make it clear, let me make it clear now that this data, and particularly the, what was the graph, what page is that on? That was in Appendix B.

MS. ROSENFELD: Pages 3-18, graph 3-3 on 3-18.

MR. GROSSMAN: Yes, that was certainly one we looked at.

THE WITNESS: The label is Figure B-9.

MS. ROSENFELD: Oh.

THE WITNESS: And I hope I made it clear that this data does not reflect, this reflects NO to NO2 ratios within 40 meters of the roadway, not, not where Mr. Sullivan has

used an assumption that it's .25. And I, if I, if I said it wrong, let me say it again, that this data applies to the 40 meter distance from the roadway.

MR. GOECKE: Okay.

THE WITNESS: So he used .25. Clearly, these particular ratios are much higher than .25.

MR. GOECKE: Okay.

BY MR. GOECKE:

Q Do you know what the averaging times were for these rations that you're relying on?

A Yes. These, these are week-long averages.

Q I'm sorry?

A Week-long averages.

Q Okay. So these are not hour-by-hour?

A They're not hour-by-hour averages.

Q So it's a different, it's a different standard?

A It's different, but it's also an indication of what's going on close to the roadway.

Q Uh-huh. And these levels here, are these mild levels or are these actual data samples?

A These are measured, these are monitors.

Q Uh-huh.

A And so this shows the ratio for what portion of NOX is actually NO2, is that correct?

Q Correct. And so this is from all sources that are

available near the monitoring location?

A That's correct.

Q Okay. So this would include not only NOX coming from emissions from the roadway itself, but other background sources?

A It's whatever is picked up on the monitor.

Q Which would include background, plus what comes from the road?

A It could.

Q I'm sorry?

A It could.

Q It could? Do you have any reason to believe that it would not take, would not measure background levels?

A No, but since the concentration gradient away from these roadways is rather steep, clearly the weighting of these ratios would be, would be dictated, or at least proportionate, disproportionately large from the roadway emissions.

Q Meaning what? Meaning that they're going to get higher as you get away from the road or --

A The, the concentrations are going to be higher near the roadway.

Q The concentrations of what?

A Of NOX and the evidence also says NO2.

Q I'm sorry?

A The evidence in various studies indicates that where there are these concentrations of traffic and exhaust --

Q No, I just want to talk about this, this data that you're relying on right here. You're kind of getting away from my question. All I want to know is what do these numbers represent? This is the NO2 to NOX ratio for background, plus the roadway, plus all other sources that the monitor would collect, is that correct?

A That's correct.

Q Okay. And when Mr. Sullivan used the .25 ratio, did that include background levels?

A The point, he assumed that there was no ozone. He, no, he was looking at --

Q Just the emissions?

A Just the emissions.

Q Okay. And so if we were to add the NO2 levels that could be found in the background onto the .25 that Mr. Sullivan used as a conservative estimate for the emissions from the tailpipes, then we would get a much higher number, wouldn't we?

A It would depend, I believe it would depend on factors such as the wind direction and what was coming in at a particular time.

Q And it would depend on the background levels,

wouldn't it?

A The ration, in other words, what you're talking about is if you took a monitor and as they did and looked at everything, it would reflect all sources that impacted the monitor, right?

Q Uh-huh.

A So I agree with that. I agree with that.

Q Okay. So this is really an apples to oranges comparison because the graphs you rely on in Exhibit 602 include background and roadway sources, whereas Mr. Sullivan's .25 includes only the emissions from the cars and not the background source?

A Well, the only distinction I would make with that is that it would depend on meteorological conditions as to what portion is background and NO2 and what portion is, is from the source.

Q Okay.

MR. GROSSMAN: I think I get that point, but let me also go back to another thing you raised that I hadn't focused on before in terms of the apple orange question, is, these are weekly monitored measurements. How does that compare with one hour modeled amounts? I mean wouldn't, wouldn't that be a significant distinction?

THE WITNESS: It is a distinction and I, I said I believe this reflected and would be rated, would be weighted

in terms of periods when, in fact, there is conversion going on which reflects, well, I think it's weighted by, like I say, by the ozone, for example.

MR. GROSSMAN: Right. But my, my concern is, in just, in trying to figure this out, that difference, when you, when you take a weekly monitored amount, then you eliminate that issue, don't you, of whether, how fast it's converted? You just, everything that's available is converted over the week, right?

THE WITNESS: No, that's, no.

MR. GROSSMAN: Everything that's available, that's why maybe I'm misunderstanding this.

THE WITNESS: Okay. Let me, let me get to that.

MR. GROSSMAN: Are these weekly measurements of one hour or are these a weekly measurement?

THE WITNESS: I think these are weekly measurements.

MR. GROSSMAN: All right.

THE WITNESS: So they integrate the measurements over a week.

MR. GROSSMAN: So does that indicate at all what happens for an NO2 one hour exposure, because doesn't that take, doesn't that measurement take into account other factors in terms of timing, how fast it's converted, whereas the weekly, weekly monitoring would not?

THE WITNESS: Yes, and I would, I would, I agree with what you just said, but I would add that there are a lot of hours when you're not going to have a high ratio and those would tend to drag down the NO2 to NOX ratio. So that the fact that the average for a week is as high as it is suggests that there must be a lot of time during that period when the ratio is fairly high. You're going to have levels dragging the thing down.

MR. GROSSMAN: Okay. All right. Thank you. Go ahead, Mr. Goecke.

BY MR. GOECKE:

Q You mentioned a moment ago that meteorological conditions would also affect the ratio between NO2 and NOX. Is temperature one of those meteorological conditions?

A Please again?

Q Sure. A moment ago you testified that meteorological conditions will affect the NO2 to NOX ratio. Is temperature one of those conditions?

A It is and it can affect it in a number of ways.

Q Tell us about that. How can temperature affect it?

A Well, for example, if there's cooling in the surface layer as Mr. Sullivan has indicated during fall, for example, or winter when you have low sun angles and you have less heating of the surface, cooling of the surface relative

to the air above it, you get very stable conditions, maybe a temperature inversion and that temperature inversion will repress mixing and affect, affect NO2 concentrations. It will halt and the wind speeds tend to be low during such periods because there's a decoupling of the atmosphere above and down. So those kinds of situations would affect things like wind speed, as I've talked about, and wind speed, slower wind speeds, as Mr. Sullivan has shown, that those cases are often occur at low wind speed periods. That, in other words, temperature has one effect. It's also going to have an effect on the rate of chemical reactions. So, yes, that would also be true.

So my point is that when you talk about temperature, there are many variables which temperature affects, some of which may lower conversion ratios and some of them may raise conversion ratios.

Q Okay.

A But I think, you know, getting back to the point, can you justify a fairly significant part of the modeling regime where you don't allow the sources to intermingle molecularly with ozone and I just, I don't think that Mr. Sullivan has made the case.

Q Right. Well, we'll talk about that further, but sticking for the moment on the ratio that you're relying on, and page 318, Table 3-3, there's four cities listed there,

Baltimore, Boise, Miami and Tampa. Which of these four cities do you think most closely represents what the conditions are like, can you --

A Which, what are you, page?

Q Page 318.

MR. GROSSMAN: This is in Exhibit 602, Exhibit 3-18, right?

THE WITNESS: Okay. You've got Baltimore.

BY MR. GOECKE:

Q You agree that Baltimore is the most representative?

A Not necessarily. It could be. One thing that's interesting about the Baltimore averages is that there is a toll booth, so you've got some congestion frequently at the toll booth.

Q And --

A I don't think the other sites do, so in that sense --

Q So would the toll booth increase the NO2 to NOX ratio, or do you increase that?

A It would certainly increase the NOX concentrations and I believe it would, it would, let's put it this way, for sure it would increase the NOX concentrations.

Q So Baltimore might be, might be higher than Wheaton because of that, the toll booth?

A My, you know, I'm not prepared to say which is the most representative, but I think my point was that these ratios are higher than .25.
Q And so your testimony before that proximity matters wouldn't apply to this situation?
A I've got to, you'll have to, can you rephrase that?
Q Earlier you testified that a modeler should select a monitoring site to use background levels that was closer to the location, but does that concept not apply in the situation here?
A Well, you're talking about Baltimore here. That's even further away than Arlington.
Q But Baltimore of the four cities is the closest?
A Yes.
Q So using your logic from earlier today, that would be the most appropriate location to use, unless that you point out there are other variables that render it --
A Well --
Q -- are under it --
A Okay.
Q -- inappropriate.
A All right. From the standpoint of meteorology, the regimes of air masses, temperature, wind distribution, I would think that Baltimore would be more representative than

Tampa.
Q Thank you.
A Okay.
Q And probably Miami, too?
A Probably Miami.
Q We've got higher temperatures in Miami and Tampa, generally, right?
A That would be right.
(Discussion off the record.)
BY MR. GOECKE:
Q And there's higher solar insulation there?
A In general, yes.
Q Wind speeds are typically higher there?
A But there's also an issue of frequency of cloud cover and things that affect -- there's a lot of cumulus development because of the sea breezes in, in the Florida peninsula that block out the sun at times.
Q Is it your testimony that Miami is a cloudy city?
A No, it's generally a sunny city.
Q Right.
A But we're also talking about times of maximum, of -- okay. I'll tell you what. Let's just say that Baltimore is, we suspect is representative. Okay.
MR. GROSSMAN: While they're thinking, I just want to go back to this question that was brought out in the

cross-examination of the, that the .25 cap only pertains to, within the queue area and not count, does not count the other .50 that, at least in stage 3, that, that Mr. Sullivan is suggesting for other sources and locations in terms of the conversion rate. If you add those two together, it comes out to .75. Is that not consistent with what you've suggested in the rest of your testimony as would be being --
THE WITNESS: If you could please state that slowly, I --
MR. GROSSMAN: Yeah, I'm just reading, go to page 33 of Mr. Sullivan's rebuttal report. That's Exhibit 466.
THE WITNESS: I, I don't have that.
MR. GROSSMAN: You don't have Mr. Sullivan's rebuttal report?
THE WITNESS: I gave it -- it's in the suitcase.
MR. GROSSMAN: Okay. So page 33 --
THE WITNESS: Okay. And what are you reading from?
MR. GROSSMAN: I'm reading the actual title on stage 3 on page 33.
THE WITNESS: Where it says stage 3?
MR. GROSSMAN: Yes, and it says assessment of expected 98th percentile peak one hour NO2 concentrations using urban dispersion coefficients with a ratio of NO2/NOX within the queue area of 0.25 and 0.50 for other sources and

locations and current background, et cetera.
So he, if I understand that correctly, I mean maybe they're not additive, I don't know, but if they are additive, would that be consistent with ultimately what you have testified, that, in fact, he hasn't really kept it? I guess the assumption of what you seem to be saying before was that he's kept the conversion at .25.
THE WITNESS: The first source --
MR. GROSSMAN: -- and it seems like --
THE WITNESS: -- I've qualified.
MR. GROSSMAN: Right.
THE WITNESS: The sources within the 40 meters is --
MR. GROSSMAN: Right. But since he adds in the .50 for the other sources, doesn't the overall modeling estimate, isn't that then consistent with what you said would be appropriate?
THE WITNESS: Is --
MR. GROSSMAN: I don't know the answer.
THE WITNESS: Well --
MR. GROSSMAN: I'm seriously asking the question.
THE WITNESS: -- are you saying that, are you saying then that what he's done here is appropriate because he's allowed the addition of those other sources?
MR. GROSSMAN: Yes, I'm asking the question. I'm

not saying. I'm asking the question because --
THE WITNESS: I think the key --
MR. GROSSMAN: -- I got the impression from the earlier testimony you gave on direct that you were naysaying his .25 figure for conversion within the box because you said that was an understatement of it, but then I see he does add in, as came out in the cross-examination, he adds in the .50 for other sources and locations. So I'm just asking you --
THE WITNESS: Okay. I'm going to, whether or not --
MR. GROSSMAN: -- whether or not considering all of that together, is his stage 3 estimate then still inconsistent in your mind with appropriate, or an appropriate estimate?
THE WITNESS: Yes, it is.
MR. GROSSMAN: Okay.
THE WITNESS: It's inconsistent because the largest emissions are going to come from the queue area in terms of what's modeled and even if you add in those diffused sources of NO2, remember those are dispersing somewhat.
MR. GROSSMAN: Right.
THE WITNESS: You're depriving the NOX at its greatest --

MR. GROSSMAN: Concentration?
THE WITNESS: Well, at the point of emissions. You're saying that there's no ozone basically to do the conversion. So I don't think, I don't think the two are the, I don't think he takes care of my problem --
MR. GROSSMAN: Okay.
THE WITNESS: -- with his assumption.
MR. GROSSMAN: All right. I understand your answer. Thank you. I just didn't want that question to pop into my mind when I was later on going over all the evidence and not have an answer to it.
THE WITNESS: It's a good question.
BY MR. GOECKE:
Q Dr. Cole, are you familiar with the difference between using OLM and OLM group?
A Yes. OLM group is, is an offshoot of OLM which allows for the interaction of a different plumes, recognizing that they may be competing for, for the ozone.
Q Do you know which method Mr. Sullivan used in his report?
A He did not mention the group, I don't believe. I don't recall that. If maybe you could call my attention to such a section if there is?
Q I'm just asking what your understanding is what he used.

A Well, he looked at area sources for the queue area.
Q So you don't know which one he used?
A To use the group, he would have looked, had to look at individual exhausts, I believe.
Q Dr. Cole, you're not answering my question. Do you know whether he used OLM or OLM group?
A I saw nothing, now I may -- I'm not aware of it, let's put it that way.
Q You're not aware of --
A I'm not aware.
Q -- of what he used?
A I'm not aware that he used the ozone limiting group --
Q Okay.
A -- method.
Q Okay. So assuming that Mr. Sullivan applied the OLM method and not OLM group, that methodology considers each source individually, correct?
A Uh-huh.
Q In other words, you don't have plumes competing for the ozone in order to convert NO to NO2?
A Just in the OLM without the group, isn't that what you're saying?
Q That's correct.

A Yes.
Q Yeah.
A Yes, that, so in a sense, the OLM without the group is a more conservative treatment than using the group.
Q Right. So you agree that he applied a more conservative treatment?
A I assume that he used OLM without the group and I would call that, given this situation, an appropriately conservative method.
Q Okay. So then I'm confused about your testimony, then. So how then did the diffused sources compete for the ozone, which I thought you testified to a moment ago?
A Excuse me, how did I --
Q I thought you testified just recently that the diffused sources within the queued area, within the 40 meter box, are competing for ozone. So if he applied OLM, that seems inconsistent.
A OLM does not include that algorithm, let's say, does not use that method, right? Do you agree with me on that?
Q Correct. Correct, that it does not use the calculation assuming that plumes --
A Have you --
Q -- are competing for ozone.
A Had Mr. Sullivan or someone else used, modeled it

in a different way by looking at individual plumes and their reaction, it may have lowered the NO2 to NOX ratio because of competition for the ozone. But, remember, when you change one aspect of modeling, you change other aspects as well. So I haven't seen a tailpipe-by-tailpipe analysis that would reflect the total NOX concentration to which the ozone is titrating into.

So you can't parse out one variable without looking at its total impact on other variables. And I, you know, to me this is speculative.

Q Okay. I'm not sure that you understand my question, but, but it sounds like we agree that there are competing sources for ozone under Mr. Sullivan's analysis?

A That would be correct.

Q Okay. What is your understanding of the ratio of NO2 to NOX coming out of the tailpipe of a car?

A Okay. Mr. Sullivan has used .25. There are values in the literature, some of which he has put into the record that show somewhat higher values, for example, going up to .3.

Q And what literature is that?

A That would be in the Norwegian tunnel studies, I believe.

Q Is that the Lerner and Lindquist report you're referring to?

A Yeah.

Q But it's your understanding that that report showed a .3 ratio?

A That was the, that was the high end of the scale.

Q Uh-huh. Okay. If I could, Dr. Cole, I'd like to show you a copy of the Lerner and Lindquist report, I'm not sure this is in the record, but it has been cited. This is, and the name of the document is NO2 to NOX ratio and emissions from gasoline powered cars, high NO2 percentage and idle engine measurements. It was printed in, it's atmospheric environment, perhaps you can tell me if you recognize this?

MR. GROSSMAN: You trailed off. It was printed in?

MR. GOECKE: I couldn't read the, on the printed copy, but in the upper left-hand corner, I don't know if you can recognize that?

THE WITNESS: Sometimes it printed --

MR. GOECKE: I think it's Atmospheric Environment, but --

THE WITNESS: That sounds right.

MR. GOECKE: -- perhaps you can tell us since it's more familiar?

THE WITNESS: Yes, Atmospheric Environment, Volume 17.

BY MR. GOECKE:

Q Okay. And that's --

A So --

Q -- direct your attention to --

A Yes.

Q -- may I?

A Yes.

Q Thank you. This is page 1397 and Table 2 shows the results of denominator measurements. And if you look at the final column, it shows that the high level of the ratio is around 25 percent, doesn't it?

A Well, it also shows other situations where the number goes up to a high of 32.5.

Q Correct, if I –

A That was, that was Table 1. Table 1, I was clear when I said that there was upper bound information that was higher than .25. And this occurred during idling.

Q So most of the results are lower than .3?

A That's a fair statement. However, I would like to put forth that these studies were done under very cold conditions, minus 6 centigrade, which I believe is about seven degree Fahrenheit, minus 14.5, well below freezing. 17.5 is minus one Fahrenheit.

Q That's for tailpipe emissions?

A These, I believe, are the outdoor temperatures.

You wouldn't have a tailpipe emission below freezing.

MR. GROSSMAN: Sometimes in my car.

THE WITNESS: So I'm saying that I'm not sure that these conditions apply, minus 17 degrees Fahrenheit, I'm not sure that's representative of -- we talked about representativeness from a climatic standpoint. These are all winter situations with very cold temperatures relative to winter temperatures in Wheaton.

MR. GROSSMAN: Thank God. Minus 17, that's Scandinavian, no? Then, again, they get to see the Aurora Borealis.

THE WITNESS: Time out. I need time out. I don't know --

MR. SILVERMAN: I'm taking notes for her.

MR. GROSSMAN: Oh, you're taking --

MR. GOECKE: We can take a break now. Now is actually a good time.

MR. GROSSMAN: Is Ms. Rosenfeld coming back or did she have to leave?

MR. SILVERMAN: I, I would hope she's coming back.

MR. GROSSMAN: Okay. So let's take, let's take a five minute break.

(Whereupon, at 4:07 p.m., a brief recess was taken.)

MR. GROSSMAN: When you said that there were other

documents that, and, well, except for Ms. Rosenfeld and Mr. Silverman is sitting in for her, but you said there were other documents that you wanted to introduce and I believe you showed them to --

MR. GOECKE: Not yet. We're waiting to get them --

MR. GROSSMAN: Oh.

MR. GOECKE: -- from our consultant.

MR. GROSSMAN: Well, all right. I was hoping that we could resolve, finish up, you know, that aspect of it today, but I guess we can't.

MR. GOECKE: I think it's unlikely.

MR. GROSSMAN: Okay.

MR. SILVERMAN: Well, are they documents relevant to any of this stuff?

MR. GOECKE: No.

MR. GROSSMAN: Okay.

MR. GOECKE: These are health studies --

MR. SILVERMAN: Health studies.

MR. GOECKE: -- to the health issues that Dr. Bunn and/or Chase and Dr. Jison may have testified about.

MR. GROSSMAN: Okay. All right. You may resume your cross-examination.

MR. GOECKE: Thank you. Thank you.

BY MR. GOECKE:

Q So, Dr. Cole, just back to the report we were discussing a moment ago, the Lerner and Lindquist report. So the Table 1 that you are referring to with the levels above .3, we agree that those measurements were taken inside of a shed, right?

A A shed?

Q A shed?

A Yes, that's right.

Q Right. So they're not, they're, they're not, they're in an enclosed area, not outside?

A Well, that's the whole purpose of it is to understand what's happening in the tailpipe itself so that the more confined the space in which you're monitoring, the less chance there is that it will react additionally with ozone in the air. So that's exactly why you would do this in an enclosed area to see, because the study is about primary or in-stack values.

Q And so it's your belief that the shed measurements are, what, more accurate than outdoor measurements?

A For, let me be very specific, for in-stack ratios --

Q In-stack ratios being the ratio coming --

A Right, in other words --

Q -- out of the tailpipe?

A In other words, if there were ozone in the air and

you measured it let's say at some distance down wind, you might get a higher ratio because of the interaction with ozone. But if you keep out the outside air, in other words, you're doing it in a shed, you're more likely to, to get a better, more precise, accurate look at what's actually in the exhaust.

Q Okay. And so then in that report then on page 1397 it says, when the measurements in the shed made it clear that the NO2 fraction of emitted NOX was higher than expected for an idling engine, the following additional experiments were made. Number one, the car was placed in a chassis dynamometer, do you know how to pronounce that?

MR. GROSSMAN: Dynamometer.

BY MR. GOECKE:

Q Dynamometer, this is a new one for me. Do you know what a chassis dynamometer is?

A I don't know what that is.

Q Okay.

MR. GROSSMAN: I think they used to use that here for the testing, the emissions testing. I don't think they use it any more because I think it was hurting cars.

MR. GOECKE: I see. Well, they used it here --

MR. GROSSMAN: I had to bring two cars into that.

MR. GOECKE: It says that they used it here and run idling after a cold start for one hour during which time

NO and NOX were measured continuously at the tailpipe.

MR. GROSSMAN: Okay.

BY MR. GOECKE:

Q And so, again, going back to Table 2, which I showed you before, we agree that Table 2 is for the idling car, well, part of it is for the idling car measured at the tailpipe itself?

A Are you referring to these numbers?

Q I'm sorry?

MR. SILVERMAN: Do you have another copy of that?

MR. GOECKE: I don't, unfortunately. I was going to make copies at the break, but we, ours is marked up.

THE WITNESS: So your point is that after the switch to idle, the numbers were 25 or below, below 25, is that what you're saying?

BY MR. GOECKE:

Q After the switch to idle --

A In this particular experiment?

Q Yeah, this experiment.

A Different --

Q So hang on. Hang on. Let's stay on this table. So --

MR. SILVERMAN: Mr. Grossman, it's hard to, to work with our witness when we don't have the document. Is it in evidence?

MS. HARRIS: Well, they were provided to the disk that we provided to --
MR. GOECKE: We have provided them to you, we just don't have extra copies here today. We could, we could make copies.
MS. ADELMAN: Has it been submitted? Is, does it have an exhibit number?
MR. GOECKE: It's not exhibit number, no.
MR. GROSSMAN: Well, let's, to be fair to Mr. Silverman and Ms. Adelman, why don't we run some copies?
MR. GOECKE: That's fine. Do you have, you don't have a clean copy, do you there?
MR. SULLIVAN: I do on the flash drive. I can do it.
MR. GOECKE: May we go make a few copies?
MR. GROSSMAN: Sure. Just ask, ask my staff and they'll be happy to do it. Make, make an extra one for the record here too.
MR. GOECKE: Sure.
MR. GROSSMAN: I figured you don't have enough reading material already.
THE WITNESS: No, I read the abstract, which was very short. I didn't go any further because it seemed satisfactory.
MR. GROSSMAN: Let's go off the record here.

(Whereupon, at 4:23 p.m., a brief recess was taken.)
MR. GROSSMAN: Somewhere in here is an exhibit list. No, that's not it. It would be if I could find my exhibit list. After all that, I can't find the exhibit list. There it is. All right.
Exhibit 604, Exhibit 604 is the NO2/NOX ratio and emissions from gasoline-powered cars, NO2/NOX ratio in emissions from gasoline-powered cars, I've got some things after that, but I think this is sufficient to identify it, by Lerner and Lindquist. And that's 1983, I guess.
(Deposition Exhibit No. 604 was marked for identification.)
MR. GROSSMAN: All right. You may continue now everybody has got a copy.
BY MR. GOECKE:
Q So, Dr. Cole, turning back to Table 2 on page 1397 --
A Okay.
Q -- and if you look at Table 2, focusing on the final two columns which are time in minutes and then NO2 to NOX times 100, which gives the NO2 to NOX ratio. So as you see in Table 2, after 33 minutes, they switched to idle.
A Uh-huh.
Q And the first measurement was taken after 36

minutes, so sometime between, I guess, less than three minutes or no more than three minutes after they switched to idle. At that point the level, the ratio, NO2 to NOX, was 14.3, correct?
A Yeah, that's what it says.
Q And then three minutes later at, at the 39 minute mark it had gone up to 18?
A Right.
Q And then it gradually increase. At 42 minutes, it's 20, at 45 minutes it's 22.1 and 48 minutes it's 23.0, at 51 it's 25.3 and then at 54 it's 24.1. So after the engine had been switched to idle, after the car had been switched to idle, it took about 20 minutes before the ratio exceeded 25 percent, is that right?
A In this particular set of results, yes.
Q In this particular set of results, yes. And this is, and if this is the particular set of results that you were relying on for a .3 or a 30 percent conversion ratio, right?
A No, I was looking at a number of these tests which are different results.
Q Okay. So when you testified earlier that there was a 30 percent ratio, you were referring to what, the shed results?
A Well, let's see. I was referring to Table 1 and

you notice that exhaust outlet under metal box, temperature minus 8.5; engine off, the car ran for 30 minutes, the engine ran for almost 30 minutes and then it was shut off and the value was 31.5. After another three minutes of idling, it was 32.5 and then it bounced around somewhere above 30 for the rest of the period. So --
Q Okay. And these, and these aren't direct measurements, right? These, this is air measurements from inside the shed where the car is running?
A Yeah.
Q So that's, that's different than the tailpipe measurements that are shown in Table 2, correct?
A Yeah, I -- I would refer you to, to give a complete answer, on page 1397 their summary of the results and discussion, they come to the following conclusions. A cold gasoline engine emits it about 6 percent of its NOX as NO2.
Q Six percent?
A Six percent. The NO2 fraction during 60 minutes of idle running rises steadily up to 30 percent. In some of the experiments, the 30 percent is reached higher. It also says that it really, results didn't vary a whole lot between the different methods.
Q And your, your reference for --
A So the --

Q Your reference, excuse me, your reference on page 1397 to the results and discussion where you say the NO2 fraction during 60 minutes of idle running rises steadily up to 30 percent. So that's for, that takes 60 minutes of idling?

A Yeah. I also point out, though, that this was under very cold temperatures and the, there's a recognition here that on a really cold and minus 15 degree day, the starting NO2 to NOX ratio after 30 minute build-up phase is smaller, obviously because the engine takes a longer time to get warm in the former case, so they qualify that and then the issue is, well, with a minus 15 degree centigrade, how often do you have that at the, at the Wheaton Mall?

MR. GROSSMAN: Although it says on the first column in the first page that due to negative activation energy for this, I can't even read the word it's so dark, maybe it's a system, the rate of reaction is enhanced by low temperatures around or below zero degrees centigrade.

THE WITNESS: Where are you reading? I'm sorry.

MR. GROSSMAN: I'm reading in the first column of the first page of the article, which is page 1395 is what it says on the bottom.

THE WITNESS: Which column?

MR. GROSSMAN: The first column on the introduction, the last paragraph and it's the last sentence

in there, it begins with, due to the negative activation energy for this --

MR. SULLIVAN: Reaction.

MR. GROSSMAN: -- reaction? Okay. The rate of reaction is enhanced by low temperatures and it says, parens, around or below zero degree centrigrade.

THE WITNESS: I'm having a lot of trouble reading this. Does someone have a better copy?

MR. GOECKE: We all have the same copy.

MR. GROSSMAN: Well, I think I read you what it says. But strangely enough, this reaction seems to enhance the colder temperatures.

THE WITNESS: I'm trying to see which reaction they're talking about. I --

MR. GROSSMAN: I assumed they were talking about the conversion.

THE WITNESS: No. If you look at the equation --

MR. GROSSMAN: Yeah.

THE WITNESS: -- it's not the same, it's not the ozone equation. They're talking about, well, I guess this is in the -- they're talking about in the emissions. So they're looking at this reaction, rate constant. They later say here when they're talking about colder temperatures, I believe they're talking about much higher temperatures and what happens is there's a --

MR. GROSSMAN: They say below zero degrees centigrade, which this is 32 degrees Fahrenheit.

THE WITNESS: Well, here they're talking about, I would, I would pose that you're not going to get these temperatures in the stack. I think what they're talking about is at low temperatures in, in the atmosphere is you're not, you're going to have a very low rate of reaction of O2 and O.

MR. GROSSMAN: I was just reacting to what you said about that, that the temperature, the lower temperature would slow down the reaction. I just saw that language. It said the opposite, that's all.

THE WITNESS: Yeah, but you're looking at two different things.

MR. GROSSMAN: Okay.

BY MR. GOECKE:

Q And so which is the correct formula to look at, Dr. Cole? Is it, is it the one above it on page 1?

A I, I would go by the, on a really cold day, minus 15 degrees say, the starting NO2 to NOX value after the 30-minute build-up phase is smaller. And for the less cold, minus five degrees centigrade weather, obviously because the engine takes a longer time to get to warm in the former case. So I think they're talking about this reaction. They're saying can we isolate what's happening inside the

exhaust which occurs at a high temperature versus this reaction outside of the exhaust, which on these particular days was, was quite cold and it's true that this reaction, this reaction is going to occur at a much slower rate in ambient, in very cold conditions.

But here they're talking about the efficiency and temperatures within -- because, because the car takes longer to warm up to its peak temperature once the idling starts. So you get, you optimize, I think you see what I'm saying.

MR. GROSSMAN: I'm not sure where, if I see where, how this affects anything I have to ultimately decide.

THE WITNESS: I don't think so.

MR. GROSSMAN: Are we arguing about the difference between .25 and .3?

MR. GOECKE: Well, no, it's going to be a bit more different, the gap will be larger than that and I'll get to that right now.

MR. GROSSMAN: Okay.

BY MR. GOECKE:

Q So let's go back to Table 2 where the results show the actual levels from the tailpipe. And, again, focusing on the bottom portion of columns three and four --

A Which table, 2?

Q Table 2 on page 1397. So the car begins idling at 33 minutes and idles for 21 minutes, at which point he ratio

is 24.1 percent. How, do you know how long the cars would idle, would be in the queue at the proposed Costco gas station during the peak hour?
A Yeah, I think we've used the 20 minutes here.
Q Right. So assuming 20 minutes, and we agree that they're not, you know, they're moving slowly, but they're not idling in the sense that they're stationary during that entire 20 minutes, correct?
A In the queue?
Q In the queue. They move from the back of the queue to the front of the line during that 20-minute span?
A Yeah, but -- true. But during the time when people are filling and you're waiting to, to move, you're stationary or at best you're at the, at 2.5.
MR. GROSSMAN: Well, hopefully you're not running when you're, when you're filling, the car is not running.
THE WITNESS: Right. Right.
BY MR. GOECKE:
Q Right. So, and here's my point, Dr. Cole. And so if you were to take an average of 10 minutes in the idle, of idle time, according to this table it would show a ratio of around 20 percent?
A Well, you can look at that, but you can also look at the, the other Table 1, other results which show much quicker and higher ratios.

Q Uh-huh.
A So it depends which, which of these experiments you want to, to use.
Q Well, according to the study, they found the levels in Table 1 too high and so that's why they did use additional tests, isn't that right?
A Can you, can you refer me to something --
Q Sure.
A -- that says that please?
Q Under, and the page 1397, in the first column, then you have the heading NO2 to NOX dependence on low. It says, when the measurements in the shed made it clear that the NO2 fraction of emitted NOX was higher than expected for an idling engine, the following additional experiments were made.
A All right. So I think they're saying let's try it in a different way because these results were unexpected. They didn't expect to find it so high, so they ran it in a variety of ways and then they later say the four different modes of outlet for the exhaust give no significant variations of the resulting NO2 over NOX fractions in the shed. I guess that's in the shed.
MR. GROSSMAN: I think we've about exhausted this, this exhibit.
MR. GOECKE: We have, Mr. Grossman.

BY MR. GOECKE:
Q And just, just the last question on this. And then contrasting the levels with idling cars with the numbers above it for a car operating at 40 kilometers an hour, those levels are much lower around, for the most part below, below 3 percent?
A I'm sorry, what are you reading?
Q Table 2.
A Table 2. Okay. And what --
Q For a car operating at 40 kilometers an hour --
A Yeah.
Q -- the NO2 to NOX ratio is no higher than 3.7 percent.
A Well, that's, that's, that's when the, when the thing is going at 40 miles an hour and the engine is efficient. It's not -- the key parameters are switched to idle.
Q Right, at 40 kilometers power, which is about 25 miles per hour, right?
A Yeah.
Q Right.
A That's a lot different than idling.
Q Well, that's my point.
A I agree.
Q Okay.

MR. GOECKE: No further questions on this document.
MR. GROSSMAN: Thank you.
MR. GOECKE: The next categories are going to take a while, Mr. Grossman. This might be a good breaking point for the day.
MR. GROSSMAN: All right. So we return at 9:30 a.m. on May 29, 2014, at the same location, that's the Council Office Building, Second Floor hearing room, 9:30 a.m. I announce it with such particularity since we're not sending out a formal notice, but this is, under the code this is allowable for a continuance of an ongoing hearing.
THE WITNESS: So, Mr. Grossman, is it fair to say that if we didn't break the record today, that it will certainly be broken the next time?
MR. GROSSMAN: I, as I said, I didn't count up the days in the last one. That's what we've all been assuming, that, that the Suburban Hospital was 34 days. I didn't personally count them up.
MS. HARRIS: And, Mr. Grossman, I think it's probably, the expectation is that we'll finish up with Dr. Cole and then we'll discuss the exhibits --
MR. GROSSMAN: Right.
MS. HARRIS: -- and that will be the conclusion?
MR. GROSSMAN: I would think.

MS. HARRIS: Okay.
MR. GROSSMAN: Mr. Silverman will bring the liver to celebrate --
MR. SILVERMAN: Right.
MR. GROSSMAN: -- right? I'm putting all you guys on notice -- you're on the record, you're on the record.
UNIDENTIFIED SPEAKER: You're on.
MR. GROSSMAN: I have nothing to do with your alcoholic consumption. I want to state that --
THE WITNESS: Just one beer is not like --
MR. GROSSMAN: All right.
THE WITNESS: -- I'm not ashamed to admit.
MR. GROSSMAN: Okay. Well, okay, the record is still, we're still here. All right. Is there anything further that we need to discuss? Then I expect that the, the parties will consult with each other about these last few exhibits so that we have a clear understanding to put on the record at our last hearing, which will be May 29. All right. Then we are adjourned until May 29th.
MR. GOECKE: Thank you.
MS. HARRIS: Thank you.
(Whereupon, at 4:52 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
Special Exception No. S-2863

By:

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Tracy Hahn, Transcriber

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