Complete Libicki Cross-Examination Transcript, PCHB No. P19-087c (4-27-2021)

Hearing - Day 10

Advocates for a Cleaner Tacoma, et al. v. Puget Sound Clean Air Agency, et ano.

April 27, 2021

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VIDEOCONFERENCE HEARING

DAY 10

Pages 2330 - 2644

OLYMPIA, WASHINGTON

April 27, 2021

8:03 a.m.

REPORTED BY: CRYSTAL R. McAULIFFE, RPR, CCR 2121

back at 12:50, because I'm going to keep us all on a tight time rein. With that, we are off the record.

(A luncheon recess was taken from 11:48 a.m. to 12:50 p.m.)

THE COURT: Okay. Let's go back on the record. And I know that we're ready for cross-examination of Dr. Libicki. But I'm going to let her arrange her camera to her satisfaction first.

Mr. Thomas, are you going to be questioning or is Mr. Bridgman? I see you both unmuted.

MR. BRIDGMAN: I apologize, Your Honor. I thought we were going to talk about demonstratives for a couple minutes, but I will mute and go later.

THE COURT: I was hoping to talk about those after Dr. Libicki is finished.

MR. BRIDGMAN: Yes, of course.

THE COURT: Okay. Dr. Libicki, you're ready to go?

THE WITNESS: I am. Thanks for the delay. Every time the video goes down, the camera resets.

THE COURT: You have to start over.

Mr. Thomas, please go ahead.

C R O S S - E X A M I N A T I O N

BY MR. THOMAS:

Q. Dr. Libicki, good afternoon. Good to see you

again.

A. Afternoon.

Q. Would it be fair to say that you did not assist with PSE's permit application for the Tacoma LNG facility?

A. I did not assist with the permit application.

Q. Okay. And a little earlier you discussed fugitive emissions at refineries with Ms. Mallick.

Is Tacoma LNG a refinery, in your view?

A. No, it is not.

Q. And would it be fair to say that all of your work concerning Tacoma LNG occurred after the issuance of the Order of Approval being appealed in this case?

A. Yes, that's correct.

Q. Okay. And would it be fair to say that your written testimony in this case is based, to some extent, on work that you performed after your deposition with me on January 14th of this year?

A. I'm sorry. Can you repeat the question?

What part of my work?

Q. Just -- just an appreciable portion of it was performed after January 14th; is that --

MS. WATKINS MALLICK: Objection to form. I don't know what "appreciable portion" means.

THE COURT: Can you rephrase, Mr. Thomas?

MR. THOMAS: Sure.

BY MR. THOMAS:

Q. Dr. Libicki, you know what, I'll leave that.

When we spoke at your deposition, you told me you had never been to the Tacoma LNG site or the Port of Tacoma.

Do you recall that?

A. I do.

Q. And have you been to the Port of Tacoma since your deposition to personally observe Tacoma LNG and its surroundings?

A. Well, in as much as we can call a FaceTime tour personally in the age of COVID, yes. I haven't been fully vaccinated but for a couple of weeks now, so I took a tour on FaceTime.

Q. Okay. Correct me if I'm wrong, but you did not personally run the air dispersion modeling underlying the testimony you provided today.

Do I have that right?

A. What do you mean by personally running?

Q. Did you set up the model and press go?

A. No, I did not set up the model and press go.

Q. Well, can you tell us who actually ran the modeling analysis that you're testifying about?

A. Sure. It was a woman in our staff at our

Lynnwood office.

Q. In your what office?

A. Lynnwood. Lynnwood, Washington. It is right up near the facility.

Q. Okay. So just one person?

A. Well, she was the one who physically put the parameters in the monitor and pressed go. I believe that's what you asked.

Q. I see.

And are you a professional engineer, Dr. Libicki?

A. I am not.

Q. Do you hold any professional certificates?

A. Other than my Ph.D., no.

Q. Okay. Would it be fair to say that you are also an expert in how drugs are transported through human skin in the pharmaceutical context?

A. Well, that's what I did my first work on out of graduate school, and that's what I have patents in. But I haven't kept up with the science in that area probably, 30 years right now.

Q. And would it be fair to say that you have no educational background in meteorology?

A. I have not taken a course in meteorology, per se; however, meteorology is simply fluid dynamics, and

that I've taken a number of courses in.

Q. And you're not employed by the Environmental Protection Agency; correct?

A. I am not employed by the EPA.

Q. And in your testimony here today, you're not purported to speak for the EPA, are you?

A. No.

Q. And have you spoken with the EPA about whether it considers Tacoma LNG to be a fuel conversion facility?

A. I have not.

Q. Okay. Does EPA routinely retain you as an outside consultant?

A. So I have some grants that I work with from the EPA. Actually, not grants to me, but I'm a subcontractor on them, so I suppose.

Q. Okay. And at your deposition you told me that Tacoma LNG was the first time you performed work specifically assessing emissions from a methane liquefaction facility; correct?

MS. WATKINS MALLICK: Objection to form. Methane liquefaction facility.

MR. THOMAS: Your Honor, it is what Tacoma LNG is. They turn methane into liquid methane. The process is called "liquefaction," if --

THE COURT: I'm going to allow it.

THE WITNESS: So I have to apologize, Mr. Thomas. Can you repeat the question?

MR. THOMAS: Sure. Yes.

BY MR. THOMAS:

Q. Is Tacoma LNG the first time that you performed work specifically assessing emissions from an LNG facility that makes LNG, like Tacoma LNG?

A. So as much as we're talking about the facility in total, I don't recall doing any work on a methane facility. However, each and every one of the processes in the facility I think I've worked on.

Q. And you and Ms. Mallick discussed Jordan Cove a bit, and you've provided a fair amount of testimony regarding Jordan Cove. But you did not work on the permitting of Jordan Cove; correct?

A. That's correct.

Q. Okay. And do you understand that Tacoma LNG is not an export facility subject to FERC jurisdiction?

MS. WATKINS MALLICK: Objection. Foundation.

THE COURT: Mr. Thomas?

MR. THOMAS: Your Honor, it's cross-examination of -- of items that Ms. Mallick discussed with the witness in depth. I'm asking the

witness what her understanding is based on that testimony.

THE COURT: I don't think you talked about whether it had FERC jurisdiction. But with that said, I'm going to let her answer it to the best of her ability.

THE WITNESS: Yeah. So I think I'm going to agree with exactly what you said. I don't think I talked about FERC jurisdiction. I don't have knowledge of that area.

BY MR. THOMAS:

Q. Do you understand that Tacoma LNG will not be exporting its LNG project?

A. So if you're using the term "export" in a technical sense, I'm afraid I can't answer that because I don't know what constitutes export in a technical sense.

Q. Okay. Do you understand that the LNG produced at LNG needs to meet a methane number of 80?

A. I have read that in the record.

Q. What specification is Jordan Cove's LNG that it's producing? What specification is that LNG required to meet, if you know?

A. I'm not sure I know that.

Q. I won't ask you any more questions about it.

I would like, if we could, to take a look at PSE 347. So your written direct.

Do you have that handy?

A. I do.

Q. Okay.

A. So you have to excuse me because I'm going to be switching from close in and far out.

Q. And I can ask Ms. Perloff to please put it up on the screen.

A. I've actually got it in front of me.

Q. And I'd like to go to page 77 of your written testimony.

And, Dr. Libicki, I would like to ask you about your testimony at line 16 where it says, quote, "What the Tribe thinks the flare can do is not relevant here."

Do you see that that?

A. I do.

Q. And would it be fair to say that you have done a lot of work assessing the flare's emissions in this case?

A. So I've done a fair amount of work looking into what the flare can do. In terms of its destruction efficiency and in terms of what's coming out of the flare.

Q. And you've got a Ph.D. in chemical engineering,

if I'm not mistaken.

A. That's correct.

Q. Given all the work that you've done, do you understand that Tacoma LNG's flare will emit carcinogens to the airshed?

A. So in -- in our world, when we talk about toxics, we can talk about them two ways. We can talk about the single molecule, which is to say that there are definitely molecules of chemicals that have been classified as carcinogens or possible carcinogens in the exhaust of the flare.

The second way we talk about carcinogens is: What's the concentration? Because there are things in the air all around us that are carcinogens. And that's why we have the TAPs and the ASILs and the evaluation.

So the simple emissions of carcinogens -- of course we would like zero everywhere -- is not something we normally talk about.

Q. But will it?

A. There are -- so I'm going to use the benzene, which I think is either a suspected carcinogen or a known carcinogen. I'm not sure what the classification is. There is benzene in the exhaust.

Q. Did you write this sentence?

A. Did I write this sentence? I -- I certainly

reviewed the sentence and agreed with it. I couldn't tell you whether I wrote it or not. This is 200 pages.

MS. WATKINS MALLICK: I'm going to object to the extent that Mr. Thomas is asking questions about Dr. Libicki's work with counsel in preparation of her pre-filed testimony.

MR. THOMAS: I'll move on.

BY MR. THOMAS:

Q. Dr. Libicki, do you know where the nearest tribal property is located relative to the flare?

A. I have read -- I've seen a demonstrative on that. And that's the level of my knowledge.

Q. So -- so not exactly?

A. Well, to the extent the demonstrative is correct, I believe it came from -- from your side, then perhaps exactly, but that's the level of my knowledge.

Q. And where is that property located?

A. You know, again, I recall seeing on the demonstrative that it was across the channel. And either below the bluff -- I think it was actually below the bluff. But again, I'm not positive that I recall that.

Q. Let's -- let's go to page 14 of this same document.

And, Dr. Libicki, do you see at page 10 you

write: "Dr. Sahu's opinion, if followed, would invalidate permits and regulations across the country that rely on such parametric monitoring."

A. Yes. Okay. I just want to make sure I got it. Sorry.

Q. How is it exactly that Dr. Sahu's opinions could possibly do that?

A. Well, this is -- this is if it were followed to its logical conclusions. So Dr. Sahu says parametric monitoring is not an appropriate way of monitoring for destruction.

Well, if it is not an appropriate way to monitor destruction, there are lots and lots of permits that use it as the way to monitor destruction. So that's what that line meant.

Q. So permits and regulations won't actually be invalidated if Dr. Sahu is agreed with?

A. This is just following it to its logical conclusion. If it can't be used, period, then there's a lot of permits out there that would be valid.

Q. We can take this document down for a few minutes.

Dr. Libicki, what is the height of the flare stack?

A. I believe it's 105 feet.

Q. All right. Can you tell me the height of the LNG tank?

A. You know, off the top of my head, I don't recall.

Q. Is it your understanding that the tank is taller than the flare?

A. Again, I just don't recall.

Q. Okay. Have you performed -- having performed all this air dispersion modeling, can you tell us the distance between the LNG tank and the flare?

A. So I mean, I've seen it on the site map. I wouldn't want to speculate. That's a knowable answer.

Q. Are you familiar with the term "building downwash"?

A. Yes.

Q. Can you tell us what building downwash is?

A. So building downwash is a phenomena just as it sounds like; and that is, when you have a building or a structure that is sufficiently large to result in impact on the exhaust from the flare, then -- then the flare exhaust is impacted.

Q. All right. When you performed the air dispersion modeling that corrected Landau's wind direction flip, did you include building downwash in each of the modeling runs?

A. We used the model set up exactly as Landau did it with --

Q. Did they account for it?

A. You know, I just don't recall. I'm sorry, because that's just not something we worked with.

Q. All right. So you can't tell me one way or the other whether if Landau accounted for building downwash?

A. Again, it's knowable. I just don't recall.

Q. And you performed the sensitivity analysis that you and I talked about back in January; correct?

A. Yes.

Q. Okay. And back in January that work, I believe, showed modeled impacts above screening thresholds for PM 2.5, SO2, and NOx.

Does that comport with your recollection of that work?

A. It was more limited than that, because it showed model levels above the 113 thresholds for limited averaging periods for those pollutants.

Q. Okay. In the performance of that work, did you include building downwash in each of the modeled runs?

A. So, again, we simply changed those two parameters in Landau's work. And because we changed those two parameters, I just don't recall whether it was there or not, because we just changed the two parameters

that we did.

Q. Okay. Let's take a look at something. If you had accounted for the building downwash in the modeling runs that you performed, would those downwash files have been produced to the Tribe in this case?

A. All of our modeling files were produced to the Tribe. Now, again, I want to point out, if what we used was the input files that Landau used, and they used building downwash, then their building downwash would have been our building downwash. So again, we did whatever they did.

Q. Let's talk a little bit about your addendum in connection to the wind flip. If you could take a look at PSE 373 with me. And let's take a look at page 6.

A. That's my addendum; correct.

Q. It is.

A. Okay.

Q. And Mr. Perloff can put it up on the screen if that is easier for you.

Page 6, lines 13 to 16 you write, quote, "As you can see on Dr. Sahu's map, the Tacoma LNG site is located between the buoy monitor and the tideflats monitor."

Do you see that?

A. Are we on page 6?

Q. Yeah. Line 13 to 16.
A. Yes.
Q. Okay. So it's your belief that Tacoma LNG is located between the NOAA buoy and the tideflats monitor?
A. Between, not exactly on a line. But generally between.
Q. Okay. I see.
Compared to the NOAA buoy, is Tacoma LNG closer to the bluff across the Hylebos Waterway from the facility? I think you were talking about a waterway earlier.
A. I'm sorry. Could you ask your question again? I got lost in the middle of it.
Q. Yes. Compare -- you were talking about a waterway and a bluff. I'm asking about that bluff.
Compared to the NOAA buoy, is Tacoma LNG closer to the bluff you were discussing with me earlier?
A. You know, I wouldn't want to say it without actually looking straight at a map. I'm trying to put the map into my brain. I believe that it is slightly closer. But again, I would want to look at the map.
Q. Okay. And same question for the tideflats station.
Can you tell me, is Tacoma LNG closer to the bluff than the tideflats station?

A. I just want to look at a map, because I think there is a map in here somewhere.
Q. Okay.
A. If not here, then it is somewhere else.
Q. Dr. Libicki, I'm short on time. If you can locate a map, great, but can we continue talking.
A. Sure.
Q. All right. And I want to keep talking about 373 here.
And if we could take a look at page 5.
And do you see where you write, quote, "The data shows that the wind direction data are nearly identical for most hours"?
A. I'm sorry. What line on page 5?
Q. It is the very last thing you say on this page.
A. I see. Right. Thank you. Yes.
Q. Do you see that?
A. Yes, I do.
Q. Okay. And down below there's a Figure 3 that supports that testimony; is that correct? The idea for Figure 3.
A. Yes.
MR. THOMAS: Okay. So let's go through this. And, Mr. Perloff, if you wouldn't mind scrolling down to the next page for me.

BY MR. THOMAS:

Q. Let's take a look at this figure. And I think you talked about it with Ms. Mallick for a bit. So the tallest bar is the one for negative 20 to zero and then for zero to 20.

What do those represent?

A. So this is the wind direction difference. And so "zero to 20" means somewhere between zero and 20 degrees off, and that's the same true from zero to minus 20. It just depends on the direction.

Q. So if the wind was exactly the same -- I just wanted to make sure I understand, would we -- between the NOAA buoy and the tideflats buoy, we would probably just see one big bar on this chart; correct?

A. You would actually see two big bars, because of the way this was done. Again, we took Dr. Sahu's format here. And it's not necessarily the format that I would have chosen. I might have done minus 10 to plus 10 so you could see that one big bar was identical. But because of the format that Dr. Sahu chose, you would have two big bars because it would fall on either side of zero, so.

Q. Did you report the actual numbers that created these bars anywhere?

A. So -- I'm sorry. I'm not quite sure I

understand the question.

Q. Yeah. So we see the tallest bar is about, I don't know, 3300; fair?

A. Sure.

Q. And I'm just wondering, is that 3300 memorialized anywhere or is the only thing that we have these bar graphs?

A. You know, this was -- I would have to think about how this was done. It's possible that all you have is the bar graphs because the counting was done dynamically. I just don't remember.

Q. All right. So we've got the one to the left is about 3300 hours, and would you agree with me that the second tallest bar is about 2300 hours; fair summation?

A. Yes.

Q. So adding those two up, would it be fair to say that we're looking at approximately 5600 hours between those two bars?

A. That's right.

Q. Okay. And would you agree with me that with the exception of leap years, there are 8,760 hours in a year?

A. That's correct.

Q. Okay. So that leaves over 3,000 hours per year where the wind direction is between the NOAA buoy and

the tideflats monitor diverge by more than 20 degrees; is that fair?

A. So around 3,000 hours; right. You made the calculation of that 5,600. It could be 5,700. It's around 3,000 hours. But I did say -- I believe when I testified it today that part of the reason it may not be on is because of that tree at the buoy that would affect wind directions.

And so, you know, it's pretty darn close but not fully close. Possibly because of that tree.

Q. Okay. And if -- if I have some time, I would like to talk to you about that tree.

But I want to stay on this for the time being.

So about 3,000 hours where we're more than 20 degrees different. And we see pretty much the same phenomenon in your figure concerning wind speed; do we not?

There's a number of hours where the wind speed at the NOAA buoy and the tideflats are blowing at different speeds; fair to say?

A. So let's take a step back and remember what this is. Remember, I didn't choose these buckets. So zero to 20 degrees is out of a 360-degree circle; so that's 1/18th of a circle. So this is -- you know, Dr. Sahu's choice as to what constitutes consistent, not mine.

Q. Understood.
A. So when we talk about what those bars are and what they represent, that's an arbitrary choice of what constitutes the correct buckets.
Q. Let's -- let's take this down. And I want to talk a little bit more about your -- your new modeling.
Let's take a look at --
MR. THOMAS: I'm sorry. Mr. Perloff, can we look at page 9 of the same document? Table 1.
BY MR. THOMAS:
Q. Dr. Libicki, for the modeling that you performed after the wind correction -- I think you said this earlier -- did I understand correctly you used all the same inputs as Landau, you just made the wind blow in the right direction?
A. So there was two sets of modeling we provided --
Q. I'm talking about Table 1 right now.
A. So let's look at Table 1. That's correct.
Q. Okay. And you used the same emission calculation --
A. You know what? I think I should note that we used the current version of AirMod. Which we don't expect to have any difference. But since you asked exactly, I did want to point that out.
Q. Okay. So this did not exactly replicate

Landau's work?

A. Except for the fact we used the current version of AirMod.

Q. I see. And you used the same emission calculations including emission factors that Landau used; correct?

A. That's right.

Q. Did your outfit, Ramboll, perform any emission calculations of its own in this case?

A. When you talk about any emissions calculations, we did do the calculations that I talked about, which was evaluating the impact of the sensitivity of emissions to the things that Dr. Sahu raised.

Q. Okay. Anything else?

A. You know, again, everything we did was in response to things that Dr. Sahu raised his questions.

Q. Okay. All right. Looking at Table 1, am I right that correcting the wind direction moved SO2 emissions closer to the screening threshold for one-hour and 24-hour SO2?

A. You said SO2 for which averaging period?

Q. One-hour and 24-hour.

A. Could you ask me the question one more time?

Q. Yeah. I think you stated it in direct.

Anyway, my question is: Correcting the wind

direction, am I right that the modeled impacts for SO2 for one-hour and 24-hour moved closer to the threshold than what was representative in Landau's modeling results?

A. I'm going to have -- because that's not what I'm showing in this table, but I can look at different tables to confirm it.

Q. If you don't know, I don't want to belabor it. We can move on. I'm trying to understand your work and how the results differed from what Landau did.

A. Sure.

Q. Looking at SO2, can you tell me the physical location where those modeled impacts occurred, those maximum impacts?

A. So, yes.

Q. Okay.

A. I mean, I can't tell you as I sit here. I looked at that.

Q. Okay. All right. And then below, let's -- let's take a look at what you did in Table 2. And you coupled the correct wind direction with Dr. Smith's stack parameters.

Do I understand that right?

MR. THOMAS: Mr. Perloff, I think maybe we have to go down maybe one more page.

THE WITNESS: Are you on page 12, perhaps?
BY MR. THOMAS:
Q. Is that where the work is?
A. That's what I see in mine.
Q. Scroll down to page 12. Great. Thank you. All right.
So you coupled the correct wind direction with Dr. Smith's stack parameters?
A. Yes, I did.
Q. Is that the point? Okay.
And what were the differences between Dr. Smith's stack parameters and those used by Landau in its modeling?
A. Dr. Smith's parameters were different than what was used in Landau's modeling because they accounted for a more refined evaluation of both exhaust and temperature.
Q. Okay. How so? Specifically, how were Smith's parameters different from Landau's?
A. Are you asking me to cite the numbers for each?
Q. How were they different?
A. The temperatures were different. I can go through each case, if you want to. But I can't do that without the numbers in front of me.
Q. No. I'm just trying to understand your work.

So were Dr. Smith's temperatures higher than Landau's? Cooler than Landau's?

A. So these exhaust temperatures were generally lower, but I hesitate to say that they all were. I just have to double-check.

Q. I see. Looking at Table 5, it appears -- and I'm comparing now between Table 1 and Table 5 in this document. It appears the results that we're looking at for SO2 one-hour and 24-hour got even closer to the screening thresholds when you modeled the stack parameters from Dr. Smith; is that fair?

A. So the -- as you can see, when you compare Table 1 and Table 5, I think that's what we're comparing; is that correct?

Q. Yeah.

A. As you can see, when we're comparing Table 1 and Table 5 of that report, the maximum for one-hour SO2 increased from 26 micrograms per cubic meter to 28 micrograms per cubic meter.

Q. So two closer?

A. Seven percent, maybe, about the right number.

Q. And then for PM 2.5, the 24-hour modeled impact stayed above the threshold; correct?

A. So that is correct. That the PM 10, 24-hour was one-tenth a microgram per cubic meter above the

threshold of 1.2.

Q. And did you watch Dr. Smith's modeling video for flaring Case 5 when he testified on Friday?

A. I did.

Q. Okay. Having seen Dr. Smith's video, do you still believe it was appropriate for Landau to use 1600 degrees as the exit gas temperature in its air dispersion modeling runs?

THE COURT: Mr. Thomas, you broke up in the middle of that -- in the middle of one of your words. I think you need to say the question again.

MR. THOMAS: Absolutely.

BY MR. THOMAS:

Q. Dr. Libicki, having seen Dr. Smith's video, do you believe it was appropriate for Landau to use 1600 degrees as the exit gas temperature in its air dispersion modeling runs?

A. So I would have to leave that whether it's appropriate or not to somebody like Dr. Smith, because that's figuring out what the exhaust temperature of a flare is. It is not my area of expertise; however, that's exactly why we do the runs to say it doesn't make a difference. And at the end of the day, it did not make a difference to the outcome of the results.

Q. With regard to the NAAQS, is what you're saying;

correct?

A. It didn't make a difference with regard to the --

Q. The results changed, did they not?

A. It didn't make a difference with regard to whether it passed the screening threshold of 113 or compliance with the NAAQS.

Q. All right. And then in your work, Landau did not do this; right?

In your work, you took the modeling result and added modeled impacts to background and then compared those to the ambient air quality standards; do I understand that correctly?

MS. WATKINS MALLICK: Objection. Objection. I don't know what work Mr. Thomas is referring to.

MR. THOMAS: Your Honor, we're still talking about the -- the Table 5 and -- and the -- the work in her addendum that I've been discussing with the witness for the last 20 minutes.

THE COURT: Well, that wasn't in the question, so. Okay. You've clarified for me.

BY MR. THOMAS:

Q. All right. Dr. Libicki, in your air dispersion modeling analysis, you took the modeled impacts, added them to background and compared those to ambient air

quality standards; do I have that right?

A. That's right.

Q. Okay. All right. I would like to go back to your originally pre-filed testimony, PSE 374. And I would like to take a look at page 87 of that pre-filed testimony. All right.

And I'd like to look at lines 1 through 6. And I guess I'll just ask the question, if you wouldn't mind reading the answer.

This asks: "Does the model used to estimate background concentration data take into account all sources of emissions?"

And your answer was?

A. "Yes. The emissions that are included in the model come from industry, traffic, and even the small emissions that come from housing and offices."

Q. All right. Thank you.

And the model you are discussing here is the Northwest AIRPACT model; do I have that right?

A. Yes and no. That -- that's the model, but the background data ultimately includes more than just the model.

Q. Okay. And is this AIRPACT -- okay. I guess maybe explain that to me. Because this is your testimony and the work that you performed, did you use

multiple models or just AIRPACT or used the AIRPACT model with AIRQUEST northwest design values; is that what you're saying?

A. Again, not exactly. Because the model itself is purely modeling. The background concentrations that were derived was a combination of modeling and monitoring data. And, unfortunately, there's -- sorry about that. There's no neat way to refer to that.

So -- so Northwest AIRQUEST is shorthand, but that's just for the model and not for the incorporation of background data from the monitoring.

Q. Okay. But in response to this Q and A in your written testimony, the model you're discussing is Northwest AIRPACT; is that right?

A. Kind of. Right. Northwest AIRPACT provides the modeling basis, but it's combined with the monitoring data to describe that. And that's what ultimately produces the background information that we used.

Q. Okay. Is the Northwest AIRPACT model run every day, if you know?

A. So the -- the model isn't -- the data that we use is from a three-year period from 2014 to 2017. And so that's the model we used. So is it run every day? Maybe. But that's not the data that we used. We used data from 2014 to 2017.

Q. Okay. Is daily marine traffic in the Port of Tacoma included in the AIRPACT model?

A. So the way these inventories work is that -- there is an inventory assessment that includes the range of information that the agencies have. In that time period, it typically included marine traffic. But as I sit here today, I couldn't tell you for sure.

MR. THOMAS: Mr. Perloff, if we could please take that down. And I would like I call up PTI 602.

BY MR. THOMAS:

Q. And, Dr. Libicki, your written testimony at page 84 hyperlinked to this, and I would like to ask you a couple of questions on it.

Are you familiar with this document? And can you please identify it?

A. I am. I don't know the name of it other than listed above. It's part of the hyperlink for this site that essentially answers questions about how the data was created.

Q. Okay. And let's -- let's go down to page 11 of this document. I'm sorry. Let's go up to page 10, please.

MR. THOMAS: And, Your Honor, I move admit PTI 602.

THE COURT: Any objection?

PTI 602 is admitted.

(APTI 602 was admitted.)

BY MR. THOMAS:

Q. Okay. And, Dr. Libicki, if you'll just bear with for me for a moment. There is language in here that I want to ask you about, but I can't find it.

Okay. Yes. So I want to talk to you about the third paragraph that starts with "Though the AIRPACT model includes"; do you see that?

A. Yes.

Q. Can you please read that sentence into the record for me?

A. "Though the AIRPACT model includes emissions from major point sources, it does not resolve the plumes from near-source impacts. Point source emissions are significantly dispersed over the 16 kilometer square grid cell in which the emissions originate. As a result, model concentrations from these point sources will have low concentration gradients through the area of interest. In addition" --

Q. Thank you so much.

I want to ask you about that first sentence where it says "It does not resolve the plumes from near-source impacts."

Would it be far to say that this language means

that the data that you used for your NAAQS analysis does not address near-source impacts?

A. What it says is that if I have a large source of emissions immediately adjacent to my site, this model wouldn't necessarily resolve. And so it's not quite as blanket as it seems. And, in fact, you know, they qualify that by -- you know, by talking about large stationary sources. And then they give kind of reason for those large stationary sources. So this is a very specific comment on their part.

MR. THOMAS: Okay. And, Mr. Perloff, we can take that down for a moment.

BY MR. THOMAS:

Q. And then just following up on -- on what you said there, Dr. Libicki.

What types of sources and activities are in the vicinity of Tacoma LNG that generate PM 2.5, if you know?

A. You know, we actually did an NEI assessment of that to look at that, and I just don't recall right now.

Q. How about SO2?

A. Same.

Q. Same for NOx?

A. Yes. We looked at it and I just don't recall what they are right now.

Q. Same for CO?
A. That's correct.
Q. Do you discuss your use of northwest AIRQUEST with Puget Sound Clean Air Agency before doing your modeling work in this case?
THE COURT: I'm sorry, Ms. Mallick. I didn't hear your objection.
MS. WATKINS MALLICK: Objection. Relevance.
THE COURT: Mr. Thomas?
MR. THOMAS: Well, I mean, I could go back to the guidance document, if I need to. But it's relevant to know if the work was cleared with the Agency and deemed to be appropriate by the Agency.
MS. WATKINS MALLICK: You're talking about Dr. Libicki working in the litigation?
THE COURT: Right. I don't think it's relevant.
MR. THOMAS: Your Honor, it -- it's simply asking whether or not the methodology was blessed by the Agency before she undertook it. It's quite relevant.
THE COURT: This is an appeal of a permit issued by the Agency. This is an expert witness on behalf of a different party in that litigation. So whether the Agency approved of that or not is not relevant to the issues before this Board.

MR. THOMAS: Okay.

BY MR. THOMAS:

Q. Would it be fair to say -- and I think you said this a few minutes ago -- that the data used to generate the design values in northwest AIRQUEST was collected between 2014 and 2017; did I hear you say that?

A. That's correct.

Q. Okay. And you performed your analysis in 2021?

A. I want to make sure. It is possible that -- that some part of it was performed prior -- in 2020 before. But some was performed in 2021, if not all.

Q. To your knowledge, does the guidance we were just looking at speak to the appropriateness of using Northwest AIRQUEST all these years after 2017?

A. I don't recall that.

Q. Okay.

A. And that's -- truly, I don't recall. I don't remember either way.

Q. Okay. Would you say that National Ambient Air Quality Standards constitute federal standards?

A. So National Ambient Air Quality Standards are, by definition, federal standards; however, many states have adopted them.

Q. Is it your view that the Northwest AIRQUEST design values can be used for determining compliance

with federal standards?

MS. WATKINS MALLICK: Objection to the extent it calls for a legal conclusion.

THE COURT: I'm going to allow her to answer with her knowledge.

THE WITNESS: I'm going to have to guess this refers to the guidance in the document. And the guidance in the document is explicit to allowing agencies to determine compliance with SIPS, and therefore, federal standards.

And when I say "specific to," that's how I, as an air quality professional, read it. Not that it says it in the guidance itself. If you would like to put up the guidance, we can go through it.

BY MR. THOMAS:

Q. All right. Yeah, let's take a quick look on this point. Let's go back to the guidance.

MR. THOMAS: 602, Mr. Perloff, and let's look at page 9.

BY MR. THOMAS:

Q. And let's look a little over halfway down the page. And do you see the question? Can these data be used for determining compliance with federal standards?

A. I do.

Q. Do you see that it says "no"?

A. Again, this is not --
Q. Dr. Libicki --
A. I'm sorry. If I can just finish this, because -- because you are asking me a specific question. And -- and this specifically says that -- that the data are gathered differently than official numbers for various reasons, and that's important. And -- and what this really means is that it is explicitly stating that an agency may not use it to show compliance with federal standards. And not that this can't be used in permitting, because later on the guidance explicitly says this is for minor source permitting.
Q. Did you draft this guidance document?
A. I did not.
Q. All right. And in utilizing these design values discussed in this guidance document, you still need to comply with the Appendix W, do you not?
A. It depends on the purpose that it is used for. Appendix W has a number of guidance -- has guidance for different modeling purposes. So you certainly don't have to comply with parts of Appendix W that aren't relevant to this.
MR. THOMAS: Mr. Perloff, if we could go down to the next page, please.

BY MR. THOMAS:

Q. Okay. And do you -- do you see the portion at the top, Dr. Libicki, referring to Section 8.3 (b) -- or 8.3.3(b) of Appendix W?

A. I do.

Q. Would it be fair to say that that portion of Appendix W can be complied with?

A. Can we look at the paragraph after that? I just don't remember the guidance perfectly, and I want to make sure I've got it all.

MS. WATKINS MALLICK: Dr. Libicki, I just want to put an objection on the record that we're calling out a section of Appendix W that we haven't looked at and is not sitting before the witness. And so it is not clear to me what Section 8.3.3(b) of Appendix W refers to.

Dr. Libicki has already testified that Appendix W applies for multiple purposes, and so it's not clear to me that this section of Appendix W necessarily is applicable here.

MR. THOMAS: Your Honor --

THE COURT: Mr. Thomas.

MR. THOMAS: Yeah, Ms. Mallick was allowed to elicit a great deal of testimony from Dr. Libicki, who is an expert in air dispersion modeling. And she's

qualified to speak to the applicability of Appendix W. Ms. Mallick was allowed to explore that at great depth. This is a very simple straightforward question.

MS. WATKINS MALLICK: Yeah. My objection was more specific to the fact that Dr. Libicki does not have this in front of her and it is extremely long. And as she said, it is very broad in its scope. And so I just want to make sure she's not asked a misleading question about what Appendix W says in certain circumstances without being able to see what Section 8.3.3(b) pertains to.

THE COURT: With all of this, I have forgotten the question.

Mr. Thomas, do you have the question in front of you?

MR. THOMAS: Yes, Your Honor. It was just a follow-up to what Dr. Libicki was saying that only portions of Appendix W, you know, per this document would apply. And I'm just simply asking that based on the language that we're looking at within this guidance document, is it her view that Section 8.3.3(b) is one of them.

THE COURT: I'm going to allow it to the extent that she knows.

THE WITNESS: So as I was beginning to

answering the question but stuttering a little bit, what I was going to say was I really want to see Section 8.3.3(b) of Appendix W to see to what it refers.

BY MR. THOMAS:

Q. Okay. All right. Well, then perhaps you can discuss that with Ms. Mallick. I'll move on and take a look at your written direct.

MR. THOMAS: So, Mr. Perloff, if you could take this exhibit down, please.

BY MR. THOMAS:

Q. And, Dr. Libicki, if we could take a look at 153, lines 11 to 13.

A. I'm sorry. Lines -- what did you say it was?

Q. Eleven to 13.

A. Eleven to 13.

Q. Do you see where you say "I have permitted enclosed ground flares for landfills and regenerative thermal oxidizers for a number of minor sources."

Do you see that?

A. Yes.

Q. Based on this, would it be fair to say that you recognized enclosed ground flares and thermal oxidizers are not the same thing?

A. No, not necessarily.

Q. Okay. And then your testimony just below, just

to quickly confirm and if you can keep looking at your testimony, it's talking about CEMS.

Does that indicate that you're also aware of CEMS being utilized on minor sources like Tacoma LNG purports to be?

A. So, unfortunately, we have to get into what constitutes a minor source. The --

Q. Dr. Libicki -- I'm sorry. All of the -- I'm just asking you about your testimony. And it seems to indicate that you're aware of CEMS being utilized on minor sources. That was my question.

A. What I was going to say is that it depends on what constitutes a minor source. When I put this up here, what I was referring to were sources that are above four tons per year of NOx in the South Coast Air Quality Management District, which are in the reclaim program. And in order to be in the reclaim program, you have to have a CEMS for NOx.

I put down minor source as a shorthand. I believe that they are minor sources according to the Clean Air Act, but South Coast has such low levels. I'm not positive. That's what I was referring to when I said "minor sources."

Q. All right. I appreciate that. Let's take a look -- same document. Let's go up to page 7 and let's

take a look at lines 20 to 21, please.

A. Page 7 of my pre-filed testimony; is that right?

Q. Yep. Very early on in the pre-filed testimony.

A. Okay.

Q. And I'm looking at lines 20 to 21, do you see where it says, quote, "Dr. Sahu's approach for calculating sulfur emissions would have resulted in a less stringent dioxide limit"?

A. Yes.

Q. Okay. I don't think you've accurately characterized what Dr. Sahu is saying, but let me ask you this.

Do you understand that the Williams Pipeline tariff for total sulfur is 5 grains per standard cubic feet?

A. That's my recollection. I think it is total sulfur as H2S, I think, but I'm not positive. I don't recall.

Q. If Tacoma LNG's incoming feed gas contains 5 grains of sulfur for a hundred standard cubic feet as allowed by pipeline tariff, in your opinion, will Tacoma LNG's flare emissions cause or contribute to an NOx violation?

MS. WATKINS MALLICK: I'm going to object here. Foundation. Also, to the extent that Mr. Thomas

is asking about a future -- a potential future violation of the facility's permit requirements.

THE COURT: Mr. Thomas?

MR. THOMAS: Your Honor, Ms. Mallick discussed, at length, what the facility will do in terms of whether or not it's -- it's going to violate NAAQS. And I'm asking an expert witness a hypothetical about an input to the facility. It's well within what was discussed by Ms. Mallick.

THE COURT: I'll allow it.

THE WITNESS: Okay. So let me make sure I understand your hypothetical, just to make sure.

So you are saying if the gas came into the facility with 5 grain sulfur, would the facility violate the National Ambient Air Quality Standards; is that your question?

BY MR. THOMAS:

Q. Yeah.

A. There's a couple pieces in that hypothetical that I unfortunately don't know. And here they are.

Q. Okay.

A. I don't know how the sulfur splits; in other words, what sulfur constituents are coming in. Because some sulfur will come go off into the heavies, and that sulfur will never go to the flare.

I don't know the meteorology at the time that that sulfur comes in, because remember, this is the worst -- the sulfur dioxide standards are short-term standards. The way the modeling is conducted, it takes the worst meteorology combined with the greatest emission rate and calculates a value. So these are very conservative calculations. And they are done in order to be conservative for permitting.

You asked me the hypothetical, if it came in at 5 grains of sulfur, would it violate the National Ambient Air Quality Standard?

And the short answer is I can't calculate that. The longer answer is I would have to run a model to look at the statistics, but based on my experience with this, it doesn't seem very likely. Just because the meteorology has to coincide directly with that input and the sulfur cannot have partitioned substantially into the heavies.

So the short answer is that's an unanswerable hypothetical. The longer answer is statistically it doesn't seem very likely, but I would have to run some models to really get an answer to that.

Q. Okay. And I appreciate that.

Did Ramboll model impacts using that 5-grains-per-hundred-cubic-feet scenario?

A. No, we did not.

Q. And just assuming for a moment that if that scenario did cause or contribute to a violation, would it be fair to say that no one would know because there is no CEMS on the flare?

MS. WATKINS MALLICK: I'm going to object to that question to the extent that it's asking Dr. Libicki about whether anyone would know exactly what was happening at any given point in time. And Dr. Libicki is not here to testify about Tacoma LNG's future plans for testing or monitoring.

THE COURT: Mr. Thomas?

MR. THOMAS: Your Honor, I just -- I just talked about CEMS with Dr. Libicki, which is discussed in her pre-filed testimony. She discussed CEMS a little bit with Ms. Mallick on direct. And I'm -- I'm asking an expert what her opinion is on this.

THE COURT: I'm going to allow it.

THE WITNESS: Okay. Forgive me. I need the question again.

MR. THOMAS: Absolutely.

BY MR. THOMAS:

Q. We were just talking about that hypothetical and if that scenario did cause or contribute to a NAAQS violation from Tacoma LNG, would it be fair to say that

no one would know because there is no CEMS located -- no SO2 CEMS located on the flare?

A. So let's remember what I talked about, is that even if there were an SO2 CEMS located on the flare, that the emissions are not violations of ambient air quality standards. The emissions plus the meteorology plus the dispersion model are what you use to evaluate whether a standard is violated.

So -- so even a CEMS, unfortunately, wouldn't really tell you if you have an impact greater than the NAAQS. That's what modeling is for. And modeling is again designed to provided a conservative estimate.

Q. As you sit here right now, do you have an opinion as to whether or not 5 grains sulfur per hundred standard cubic feet would result in a violation of the Order of Approval's Condition No. 16?

MS. WATKINS MALLICK: I object to the extent that this is outside the scope of Dr. Libicki's opinions.

THE COURT: Mr. Thomas?

MR. THOMAS: Your Honor, first of all, I mean, Mr. Frank was asking very -- very similar questions about violating the permit all year long. Ms. Mallick and Dr. Libicki did cover permit compliance, and it is also covered in Dr. Libicki's written direct.

I'm simply asking her opinion on whether or not maximum sulfur in the feed gas in her opinions would result in a violation of the permit condition.

THE COURT: I think -- you changed your -- your hypothetical right there. So I'm going to allow it, but I think we need to stick with cross-examination of her actual testimony.

MR. THOMAS: Thank you, Your Honor. I'll ask once more.

BY MR. THOMAS:

Q. Dr. Libicki, given the testimony that -- that you've provided both written, and oral this afternoon, regarding compliance with permit conditions, I'm wondering if we have 5 grains of sulfur per hundred standard cubic feet, do you have an opinion on whether or not Tacoma LNG's flare will emit SO2 in excess of the permit Condition 16?

A. You know, I don't. I would have to see how that partitioned in the system. I'm sorry. There's too much upstream for me think about that. Incidentally, when I was answering my other question, I left processing rate out of one of the answers to whether it would violate an ambient air quality standard, so I apologize for that.

Q. All right. Let's change gears a little bit and talk about fugitive emission factors. And you discussed

with Ms. Mallick comparisons between EPA and SCAQMD emission factors.

Do you recall that?

A. Yes, I do.

Q. And those SCAQMD emission factors are for marketing terminals, slash, depots.

Do I recall that correct?

A. That's my recollection.

Q. And what are marketing terminals, slash, depots?

A. I understand it to be where fuel is moved.

Q. Where fuel is moved?

A. Okay.

Q. Not where fuel is made?

A. Again, marketing terminal/depot, that's generally where fuel is moved.

Q. Okay. And are the SCAQMD and EPA fugitive emission factors based on the same definition of volatile organic compound, if you know?

A. It's not very clear. South Coast says that their factors exclude ethane and methane. We have in the past and actually through this case tried to evaluate the source of the South Coast emission factors. And when we have proposed -- presented to them a Public Records Act request, which is in California the version of FOIA, and asked them what those factors were based