IN THE MATTER OF AN ARBITRATION BEFORE A TRIBUNAL
CONSTITUTED
IN ACCORDANCE WITH THE TREATY BETWEEN THE U.S.A. AND THE
REPUBLIC OF ECUADOR CONCERNING THE ENCOURAGEMENT AND
RECIPROCAL PROTECTION OF INVESTMENT, SIGNED AUGUST 27, 1993
(THE "TREATY")

and

THE UNCITRAL ARBITRATION RULES 1976

In the Matter of Arbitration Between:	
CHEVRON CORPORATION (U.S.A.), TEXACO PETROLEUM COMPANY (U.S.A.), Claimants,	PCA Case No. 2009-23
and	
THE REPUBLIC OF ECUADOR, Respondent.	Volume 8

TRACK 2 HEARING

Thursday, April 30, 2015

The World Bank
700 18th Street, N.W.
J Building
Conference Room JB1-080
Washington, D.C. 20003

The Hearing in the above-entitled matter convened at 11:15 a.m. before:

MR. V.V. VEEDER, Q.C., President

DR. HORACIO GRIGERA NAÓN, Arbitrator

PROFESSOR VAUGHAN LOWE, Q.C., Arbitrator

Registry, Permanent Court of Arbitration:

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C O N T E N T S

P R O C E E D I N G S

PRESIDENT VEEDER: Good morning, ladies and gentlemen. We'll start Day 8 of this Hearing.

We won't do housekeeping now, except to recall that we have received a draft letter from the Parties in relation to writing to Mr. Klasfeld; and, on the basis of this agreed draft, our secretary will write to Mr. Klasfeld in those terms later today.

I take it, it is agreed?

MR. BISHOP: It's agreed by the Claimants.

PRESIDENT VEEDER: And the Respondent?

MR. BLOOM: It is agreed.

PRESIDENT VEEDER: Thank you very much. Well, we'll continue with the cross-examination.

GREGORY S. DOUGLAS, CLAIMANTS' WITNESS, RESUMED

MR. GARCÍA REPRESA: Thank you, Mr. President.

CONTINUED CROSS-EXAMINATION

BY MR. GARCÍA REPRESA:

Q. Dr. Douglas, good morning.

A. Good morning.

Q. Now, I would like to pursue for a few minutes the topic we were discussing yesterday at the end. And to set the record straight, when we finished our conversation, you had confirmed that only a subgroup of the samples that were collected during the Judicial Inspections was subject to

11:17 biodegradation studies; is that correct?

A. Did you say that I had a concern?

Q. No, that you have confirmed.

A. Oh, yes, I think about 400 samples were analyzed for biodegradation analysis, yes.

Q. Okay. And the rest of the samples were not submitted to biodegradation analysis; correct?

A. My understanding is that the high-level oil samples were submitted for biodegradation because we can only evaluate biodegradation when there's oil in the samples.

Q. So, the rest were not submitted to biodegradation studies?

A. Not that I'm aware of.

Q. Okay. And, therefore, the rest of the samples were also not submitted to tests to identify alkylated-PAHs; correct?

A. Not that I'm aware of.

Q. Now, one question that remained unanswered yesterday was whether, in your opinion, if you were to increase the sensitivity of the analysis to capture and to test for alkylated-PAHs, that would allow you to improve the accuracy of your detection and measure of petroleum at a distance from the source. Is that your opinion?

A. I guess it depends on the purpose of the analysis.

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11:18 If it's for regulatory purposes, as I mentioned, you really wouldn't need that kind of sensitivity. However, for biodegradation and for forensics work that I do, yes, I do use that sensitivity.

Q. And would you also use that sensitivity, for example, for health-risk assessment?

MS. WOOD: Objection, Mr. President. I believe we've already established that this Witness is not a toxicologist, so his opinions on health-risk assessment does not appear to be relevant to the Tribunal. Dr. McHugh, who is a toxicologist will be the next witness.

PRESIDENT VEEDER: What's your answer to the objection?

MR. GARCÍA REPRESA: My answer to the objection is that I'm not asking for a toxicological assessment but rather what you use the samples for, and in his field of expertise having looked at the data and having opined on what the data should be looked at for what purpose, I think it's perfectly valid to ask him what samples are used for what independently of what the assessment is of those sample results afterwards.

PRESIDENT VEEDER: Well, you're taking up a lot of time on material impressions that might be better asked to another witness.

But can you answer the question?

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11:19 THE WITNESS: Well, with regards to the compounds that you're referring to, my understanding is the that 16 priority pollutants are the compounds for health-risk assessment.

Now, for the samples that we received, they were heavily oiled--oiled to some level to evaluate biodegradation, and what happens is that that oil makes it more difficult to measure those compounds.

And so, I believe that for oil samples, clearly the methods are appropriate, yes. For the 16 priority pollutants that you're referring to.

Q. No, I was referring to alkylated-PAHs, not to the 16 priority pollutants.

A. Well, I'm not--as you said, I don't know what the appropriateness is of alkylated-PAHs with regard to health risk.

Q. Fine.

If we can go to Tab 16 in your bundle--it's the first volume--this is an article that you wrote and that you referred to as Exhibit 16 to your 2013 Expert Report.

A. Tab 16?

Q. Tab 16, 1-6.

A. Yes.

Q. And I'm looking at Page 50, bottom left-hand corner. This is a document we already looked at yesterday.

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11:20 A. Yes.

Q. And it has three columns. I am looking at the right column towards the middle of the page.

And I just want to be clear--and to put the context for my question--I am reading towards the middle of the page on the right, a sentence that begins with, "The increased sensitivity allows for petroleum to be detected and measured more accurately at a distance from the source and replaces the traditional not-detected results with a useful data point--often crucial information if any toxicological numerical modeling is intended for the site assessment."

Do you see that, sir?

A. Yes.

Q. Is that your opinion?

A. It is, yes. This basically suggests that the methodologies that we're providing in terms of the selected ion mode are more sensitive and could be more useful to people.

Q. And if we keep reading, you also say that the increased sensitivity relative to the standard method full scan techniques also enables these methods to measure the water soluble fraction of petroleum in ground and surface waters.

Do you see that?

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11:22 A. They're very useful for that purpose, yes.

Q. Okay. Now, if we can please go to your 2013 Expert Report at Page 10--it's at Tab 2 of the first volume for those using the black binders--and I'm looking at the first paragraph right below the bullets, which begins, "As a marine biologist."

Now, you commented here about Dr. Short's evaluation of the toxicity of weathered oil, and you were referring to his conclusion that alkylated-PAHs in weathered oil are still toxic even many years after the spill and at low parts per billion concentrations.

Is that a fair characterization of what you were commenting on here?

A. Yes. He said that the toxicity of weathered crude oil was significant at one part per billion concentration level in seawater.

Q. Okay. And in the next paragraph you go on to say that the findings by Dr. Short--and unfortunately he hasn't been called--the findings by Dr. Short you say are considered highly controversial by the scientific community.

Do you see that?

A. Yes, and that is my understanding.

Q. And to be clear, this study by Dr. Short was in connection with the Exxon Valdez spill; correct?

A. Yes.
Q. And you had been retained by Exxon or its counsel in that very same case; correct?
A. I worked on the Exxon Valdez spill for Exxon, yes.
Q. Now, if you turn the page--so we are now at Page 11--the source that you cite here for the criticism to Dr. Short's conclusion is an article by Dr. Landrum, and we can see there's a quote and we can see the reference at the bottom of the page to Dr. Landrum's article which is at Exhibit 24. Do you see that, sir?
A. I'm sorry, which page are you on in my Report?
Q. Page 11 of your Report.
A. Yes, I see that.
Q. You are quoting text of an article by Dr. Landrum; correct?
A. Is that the top or the bottom?
Q. I'm looking at the top of Page 11.
A. Okay.
Q. You have two lines and then a block quote. I understand that block quote to come from Dr. Landrum's article cited at Footnote 55; correct?
A. That's Page, et al., 55.
Q. Yeah, and Dr. Landrum is cited there as one of the authors, isn't he?
A. Yes, he is.

Q. And actually in the paragraph right below the quote, you state that Dr. Peter Landrum is one of the many internationally respected scientists who have refuted Dr. Short's claims.
Do you see that?
A. Yes.
Q. Now, Dr. Landrum had also worked for Exxon, hadn't he?
A. I don't know. I don't know.
Q. But the paper that you're citing to here, that paper was funded by Exxon, wasn't it?
A. I'd have to see the paper and look at the Acknowledgments in the back to see if it was.
Q. You going to have to change volumes now. Volume 2, Tab 21, please. And you should find the Acknowledgments at Page 253?
A. I'm sorry, two-five--
Q. Three.
Do you confirm, sir, that this article was funded by Exxon?
A. Yes, it says, "The authors thank Ms. Karen Humphrey of Aquatechnics, Inc. for her excellent critical review of the draft of this article. Funding for this work was provided by ExxonMobil Corporation, Houston, Texas. However, the conclusions are those of the Authors and do

not necessarily represent those of ExxonMobil."
Q. Right.
And are you aware, in addition to this study that you cite here, that there are other studies that you have not cited in your Report that corroborate Dr. Short's conclusions?
A. Well, the purpose of my comment in my paper was to simply state that this is a controversial issue, and it is a controversial issue. There are many papers on both sides of the issue and publications, so the use of a concentration of one part per billion as the toxic level and that the alkylated PAHs are responsible for that concentration of that toxicity of that effect is simply a controversial issue. I'm not weighing in on it's right or wrong, other than saying you wouldn't just want to accept that number without looking at all of the information.
Q. I would like now to turn your attention to Slide 12 of your direct presentation yesterday, and I will show it to you if you need it.
A. No, I have a copy.
Q. You have it?
A. I have a copy, if I can just find it. Yes.
Q. Now, this is the slide that I understand summarizes the various methods, analytical methods, that have been discussed here, and here you're answering the

question which one of these is appropriate. Is that a fair understanding?
A. Yes.
Q. And I understand that which one is appropriate depends on the intended use of the data.
A. Yes.
Q. And to make sure I understood correctly, if we go from the top to the bottom, we are narrowing down the individual compounds that are being tested for; correct?
A. Yes. The top group has the most interferences, and then we focus it down into individual compounds by GC/MS.
Q. So, the top line--and I'm going to try to put this in layman terms as we go through--the top line is the one that will cover--let's say all organic compounds, but will give us give us a higher risk of what is known as false positives; is that correct?
A. Well, yes. The top line TEM, total extractable material, that's the bulk screening method, and that's the one that captures all the carbon molecules in a sediment or in a soil sample. And again, what you end up with when you do that is simply a number that could be--could be all oil, could be very little oil. You don't know.
Q. And there in terms of--I want to understand how the risk of false positives and false negatives works in

these methods because those concepts have been discussed in your Reports and in Dr. Short's reports.

Now, to be clear, a false negative is a result that shows no contamination with petroleum hydrocarbons, but actually it is contaminated, so a false negative will be a sample that is contaminated that is discarded and, therefore, is not--is not detected or remediated; correct?

A. Yes.

Q. And a false positive on the reverse side is a result that will show contamination, but actually it is not contaminated with petroleum hydrocarbons; is that correct?

A. Yes, it is.

Q. And I understand that in this graph the top method has the higher, if we just look at these methods here--the higher risk of false positives and the lowest risk of false negatives, and the bottom methods we are reversed: They have almost no risk of false positives and a higher risk of false negatives.

A. All right.

Q. Is that--I can break it down, if you want.

A. Break it down for TEM. Let's talk about TEM first, and then we can go to the next one.

Q. I'm just mindful of the time, but fair enough. Otherwise, I can break it down into questions.

A. Well--

MS. WOOD: Objection, Mr. President. The Witness is clearly asked that he didn't understand the question and would break like to break it down, and that's why I ask--thank you.

PRESIDENT VEEDER: If counsel was suggesting he would do that, so please do that, but also please don't overspeak.

THE WITNESS: Oh, I'm sorry.

MR. GARCÍA REPRESA: Apologies, I did overspeak.

BY MR. GARCÍA REPRESA:

Q. Let's look now at the top line.

This is the method I understand that will give you the less risk of false negatives; i.e., you're sure you will cover everything in a way, and it will give you the highest risk of false positives, the lowest risk of false negatives; correct?

A. For semi-volatile organics, yes, I would agree with that, very high risk of false positives.

Q. And very low risk of false negatives; correct?

A. Well, for the semi-volatile components.

Q. And if we now look at the bottom, where you're analyzing individual compounds--and you actually list them to the right of it, BTEX and the PAHs, the 16 priority pollutants--there, you are lowering to a maximum the risk of false positives, but you're also increasing the risk of

false negatives; correct?

A. I mean, it's a more accurate method, if that's what you mean. It more accurately identifies and quantifies what's actually in there, so in terms of false positives and negatives, those are driven by the blanks associated with the analysis.

Q. And we'll speak about blanks in a moment.

A. Um-hmm.

Q. I just want to understand. The fact that you are narrowing down so much the process will help you reduce the risk of false positives because you will know what's in there, but it will also increase the risk of false negatives because you may be leaving some compounds out of your analysis; isn't that right?

A. No, I think that these methods are very accurate and precise. I think that the fact that you can actually identify and see the presence of those compounds in your sample means that you get the most accurate values.

So, for example, the 16 priority pollutant target compounds, I think this would be the most accurate way to measure those.

Q. Right. And that is if you are testing specifically for those.

A. Yes.

Q. But?

A. But--

Q. Let's not overspeak.

A. Oh, I'm sorry, excuse me.

Q. That is, if you're testing specifically for those, and we agreed that that will not help you, for example, identify the alkylated compounds; correct?

A. Yes, if you were just looking at the 16 priority pollutants, you wouldn't necessarily quantify the alkylated-PAHs in the sample.

Q. And the choice of a method within this range will depend on the intended use of the data?

A. The purpose, yes.

Q. Now, you mentioned a moment ago the issue of blanks, and I'd like to discuss that with you for a few minutes.

Now, in your direct presentation, you described two types of blanks: The field blanks and the laboratory blanks, and you said that it was important to consider them, and you indicated that to determine if a blank is actually the cause of contamination that you find in indoor samples, there's standard method called the 5X rule. Do you recall that part of your presentation, sir?

A. Yes, I do.

Q. And you describe the rule as being that sample results must be five times greater than the compound that

you found in your blank for the field sample result to be reliable and reported as a positive finding. Is that a fair summary?

A. Yes, as defined on Page 23.

Q. And in your Report, in your work in this case, you applied that rule, and I believe you said that that led you to disregard as unreliable about 90 percent of the compound results from LBG data; is that correct?

A. No, no, that's not correct.

Q. What percentage would it be?

A. Most of the impacts by blanks were associated with low level water samples. So, in fact, blanks would affect about half of the surface-water samples and the interpretation of those water samples.

Samples that LBG performed, for example, that were above the blank level were not impacted by the blanks, so I had no intentions of implying that 90 percent of the LBG was unreliable. I was focused on the low level samples, specifically a lot of water samples, for example, that were being used for interpretive purposes where the blanks had a significant impact on the interpretation.

Q. And at Slide 30 I believe it is of your direct presentation, you showed a diagram comparing the concentrations in a soil sample. It's soil sample LA, for Lago Agrio, 16, I understand that's for the site, and SL

stands for soil 002. We have the result of that sample in the red column, and you compare that to a laboratory blank in the blue column; is that right?

A. Yes, I do. It's--the PAH concentration is presented on the left in parts per billion. The PAHs are listed on the bottom there that were reported by the laboratory. The red bars represent the field results for the sample, and the blue bars represent the normalized laboratory blank results.

Q. Okay. And we'll get back to the concept of normalized.

Now, to be clear, in this example that you put here, because the red bars are lower than five times the blue bars, this is why you consider the data to be unreliable; is that correct?

A. Yes.

It is common practice that in the laboratory environment for evaluating environmental samples, that if you even have as many as two analytes within an analytical run that exceed three times or five times what's called a method detection limit--it's a very low concentration, but if you find these blank compounds within your sample, you may be required to reanalyze the entire batch of samples. It's common practice.

And if you have more than that, then you have to

investigate it further because you have a more serious problem.

And what we found was that, in cases where we had over 50 percent of the compounds impacted by the blank and the support of the laboratory with regards to their identification of a chronic problem within the laboratory operation, it certainly is very reasonable to reject that sample 100 percent. That's what I intended to present.

Q. And when you referred to the blue columns being the normalized figures, that is because the numbers that you used for those blue columns, those are not found in the LBG analytical results, are they? Those numbers are a treatment of LBG's data that you did that you called "normalization." Correct?

A. Well, what happened is, after we received the validated results, the validation results from LBG--this was after I provided my--I believe--well, I'm not sure of that--I'm not sure--but we noticed that the validator did not normalize the field results, the soil results, where there were different weights for the soil sample and the blank sample.

So, I'm simply following National Functional Guidelines with regards to the fact that blanks may not involve the same sample weights, and they need to be normalized for direct comparison.

Q. And I could not help but notice that this graph that you showed us yesterday is, in fact, an amended version of a graph that you had in your latest report, and you can take a look at Figure 1, Page 6, of your January 2015 Report. I suggest we keep them both open, so your Slide 30 in the graph at Figure 1, Page 6.

A. Figure 1, Page 6. Yes. I have both figures in front of me.

Q. Thank you.

And to be clear, we are seeing figures that relate to the very same soil sample; correct?

A. LA16-SL002 was one of the key samples relied on by Dr. Short to identify the presence of low levels of petroleum hydrocarbons in the environmental samples within his Report. Yes, this is the correct sample.

Q. And the difference between the graph you showed us yesterday and the graph you had in your Report is that in your Report, you showed the concentrations of a soil blank with the bar--with the black bars; correct? And we do not see in the figure you showed us yesterday that soil blank indicated.

A. Right.

And just so the Tribunal understands what we're talking about, we should refer to my presentation of figure--okay, Figure 22 in my presentation. And in that

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figure I described in my presentation what a--when you say soil blank, I just want to make sure it's clear that the soil blank that you're referring to is actually called a field blank; right? Are we in agreement? I mean, is that what we're talking about, the field blank?

Q. I hesitate when a witness asks me a question, but you're very right. This is field blank.

A. Field blank.

Q. Let's not overlap.

Yes, we're talking about a field blank which you described yesterday separate from a laboratory blank.

A. Yes.

Q. And that you described I understand at Slide 22 of your presentation.

A. That's correct.

And so, for the Tribunal, the field blank is a sample where you send out a clean material--it could be clean Sand or it could be clean water--and you take it out into the environment that you're collecting the samples, and then you handle it in the same way. You might put it in a bowl, stir it up, the same bowl that you would use to collect your field samples. And then what you would do is put the sample in a jar and send it back to the laboratory for analysis, and that sample would pick up any extraneous contamination that could have been introduced during the

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collection process.

And that is compared to the laboratory blank, which is also presented in my Report, and the laboratory blank is a clean sample that's run by the laboratory, and that collects all the contaminants that would be associated with the laboratory operation, okay?

Q. And you would expect that if there is a chronic problem with laboratory contamination, the field blank that is tested by that same laboratory will also show levels of contamination similar to the laboratory blank, would you not?

A. Well, they won't be exactly the same. They weren't run necessarily at the same time under the same conditions. And blanks move up and down, depending on how the sample is handled by the individuals. So, there is some variability.

And because of the variability, that's why they have the 5X rule, so I wouldn't expect them necessarily to be the same. For example, if all the field blank was from the--if all of the field blank was from the laboratory blank, they would look pretty similar, within the 5X rule.

Q. And you see, that is where I have an issue with the graph that you showed us yesterday because, in Figure 1 of your 2015 Report, we can see that the lab blank and the field blank show very different patterns, and I'm looking

1722

at the blue and the black columns. So, I would have expected that if we're talking about a problem with the lab contamination, the field blank will also show levels of contamination similar to the ones you find in the lab. Would that not be a fair expectation?

A. No, it's not a one-to-one relationship. Blanks are very complicated in terms of how they're handled, and the field blank has both contamination from the field as well as contamination from the laboratory.

Now, the way I used this type of information is that I would take the field blank and correct it in the same way as I would the laboratory blank, and then I would compare the two. And if the field blank was some amount higher than the laboratory blank, then I would then investigate that further in terms of a field blank problem.

But under this condition, I relied primarily on--you can see that the 5X rule is violated simply by the laboratory blank, which it is a property to correct for that.

Q. Would it be fair to say that if there is laboratory contamination and a problem with the field blank, the results of the field blank should be higher than the results of the laboratory blank?

A. In some cases, but it's not a one-to-one relationship. The field blank may have gotten a little

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less from the laboratory, depending on how it was handled or when it was extracted or analyzed and how it was processed. So, it's not necessarily the case.

The primary blank that I rely on here is the method blank, the laboratory blank.

Q. Right. When you say here, it's in your presentation, not in your Report; right?

A. Well, it's presented here.

Q. Okay.

A. If you take the field blank, I was criticized in Dr. Short's Final Report that you're not supposed to correct the field blank, so what I did is I just simply said, okay, let's put the field blank aside, but in his discussion, he only mentioned a criticism of the field blank. He never discussed, for example, that the laboratory blank was not supposed to be normalized appropriately. He never mentioned that in his Report, which, by his silence, meant that he agreed with me that the method blank should certainly be normalized appropriately under the National Functional Guidelines.

So, what I did for the purposes of my presentation today, is because of time and energy that I had for it, I simply removed the field blank just so I didn't have to discuss that issue for the Tribunal, but the method blank is really the key blank because the laboratory runs it

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specifically with those batches of samples, and it's the blank that most closely connected to the problem of blank contamination, which has been identified by the laboratory itself. That's why I didn't discuss the field blank, I didn't want to get into the fact of--I mean, when I look at the blanks, I do correct the field blank, I routinely correct the field blank, and I compare that to my method blank, but it's not going to be a one-to-one relationship. Blanks don't behave that way in the samples. Again, that's why the EPA has decided that the 5X rule is appropriate to be sure that you're not having a blank contamination problem.

Q. Do you recall what my question was?

A. Well, with regards to the--your question was with regard to the field blank and why would the field blank be exactly the same as the method blank, and my answer is no, it wouldn't necessarily be the same.

Q. That wasn't my question, but the record is clear, and I just want to request, if you can, to try to keep your answers a bit shorter.

A. Sure.

Q. We will try to advance that way if we can.

A. Okay.

Q. Now, for the record--and it's now being shown on the screen--the graph I understand that you were referring

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to from Dr. Short's latest Report is now being shown, it's Figure 3 of Dr. Short's March 2015 Report, and we know that he hasn't been called to explain that.

Now, you referred to a moment ago to the National Functional Guidelines. I understand that that is a 1999 USEPA Guidance on which you rely for your 5X rule; correct?

A. I have been using the 5X rule for many, many years in my work, so that's one version of the 5X rule.

Now, in the LBG Auditor's Report, they also apply the 5X rule as well, so it's appropriate for both 1999 and obviously, in 2008, given that LBG's laboratory applied it as well.

Q. You were anticipating my questions but I think that will facilitate the discussion.

To be clear, in your Reports, you only discuss the 1999 USEPA Guidance; correct?

A. Yes, those are the Guidelines that I rely on primarily because it invokes the 5X rule which has been used in standard practice in most laboratories around the country.

Q. But you're aware--and this is why you mentioned it now and you mentioned it yesterday--you're aware, are not, that there are more recent EPA Guidance that apply to the issue of blank contamination; correct?

A. Yes, I am.

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The 2008 Guidelines were used by the LBG validator. And if I had applied those Guidelines, I would have even been more rigorous and had rejected more compounds using the 2008 Guidelines.

Q. And there are also some 2011 Guidelines, are there not?

A. Not for semi-volatile organic compounds. My understanding is that the 2011 Guidelines were for the dioxin compounds.

Q. Well, you have that discussion, have you not, in Dr. Short's latest Report, but I just want to be clear that you don't rely on the 2011 Guidelines, do you?

A. Oh, no.

Q. Okay. Now, let's look at the 1999 Guidelines, if you will. It's at Tab 22.

Now, I would like you to look. It's a bit long, but just to confirm on the basis of the first page, these are the Guidelines we were looking at--you were referring to, excuse me, from 1999; correct?

A. Yes, they are.

Q. And these are the only ones mentioned in your Reports; correct?

A. I believe so.

I did discuss 2008, I believe, in my Second Report.

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Q. I'm sure my colleagues will be able to point that out on redirect.

Now, I would like you to please take a look at Page 60, 6-zero. And you may begin actually at Page 58, so that we can see the titles, Page 58, begins with a section a blanks; correct?

A. Yes, that is correct.

Q. And if you turn the page, we will see on Page 60 the examples that are provided of how to apply these Guidelines; correct?

A. There are some examples, yes.

Q. And to understand this clearly, we're now looking at Example Number 1. It says, Example Number 1, the sample result is greater than the Contract-required quantitation limit, but it's less than five times or ten times multiple of the blank result.

Do you see that?

A. Yes.

Q. Now, a quantitation limit--I think you mentioned that term yesterday--is the lower threshold that's defined by the lab for considering that a result is precise or accurate; correct?

A. My understanding is that it represents the lowest standard in their calibration in this particular situation.

Q. Did you calculate any quantitation limit when you

11:53 did your data validation?
A. Yes, we did compare them to quantitation limits. I don't recall what they were. I know that they had on the order for waters, I think they concentrated to 100 micro liters, they had a 10-nanogram per liter standard that that would make it a 1 nanogram per liter detection mass wise, and then divided by the volume.
Q. Is it your testimony that, in your data-validation process, you looked before applying the 5X rule whether the blanks were below or above a quantitation limit? Yes or no.
A. Well, I have to recall.
I think that quite honestly, no. For the work that I did, I include anything above three times MDL or a little bit above the baseline, I include all of the data beyond the quantitation limit for a 5X rule.
For example, if compound is present below a quantitation limit, then you would still apply the method blank associated with that in the 5X rule.
Q. Let me now understand because you said you included all the data, and then you said "for the 5X rule," so I want to understand what your testimony is.
When you applied the 5X rule, did you consider what impact a quantitation limit had on the treatment of your blanks, or did you simply look at the blank

11:55 concentration and multiplied it by five?
A. I looked at the blank concentration that was recorded by the laboratory and multiplied it by five and compared that to the sample, yes, and that is my standard practice.
Q. Okay. And if we look at the--go back to the examples in 1999, all of these examples--one, two, and three--show blank results above the quantitation limit; correct?
A. In these examples, yes.
Q. And actually, there is no rule in these Guidelines that tells you how to treat blanks when they are below--excuse me--how to treat samples, field samples, when the blanks are below the quantitation limit but the sample result is above the quantitation limit; is that correct?
A. Well, not in these examples.
Q. And there is no rule outside of these examples in these Guidelines that tells you what to do in that situation, is there?
A. I can only tell you that it's standard practice in the laboratory industry.
Q. But you're aware, are you not, that the 2008 Rules do have a specific provision for the situation where the blank result is below the quantitation limit but the field result is above? Are you not aware of that?

11:57 A. Could we pull up the 2008 criteria?
Q. Of course. It's the very next tab.
A. Good.
Q. And you can go at Page 112. Yes, sir. And for the record, that's Exhibit C-2094. Page 112 you should normally find a table.
A. I'm sorry, I see Page 28--oh, I'm sorry, that's for trace volatiles. Excuse me. Semi-volatiles.
So, for semi-volatile organics, 112, yes, I have that page.
Q. Thank you. And so that the record is clear, at Page 109, the section on blanks for semi-volatile organics begins; correct?
A. That is correct.
Q. And if you turn the pages up to Page 112, there we find Table 31 which tells us what the Guidance says, depending on the combination of the blank result and the sample result; correct?
A. Yes. My understanding is that these are the Guidelines that were used by the validators for the LBG data.
Q. And this is the guideline that was in force when you submitted your Report, was it not?
A. Well, you have a selection of Guidelines that you can use when you're interpreting laboratory data. I mean,

11:58 the Guidelines from 1999 don't mean they're invalid. All the data that was generated or produced prior to that all of a sudden doesn't just become unacceptable. I prefer to use the Guidelines because they're common sense.
And, for example, with regards to your issue of how do you deal with blanks below the quantitation limit specifically, if you use data below your quantitation limit, you certainly can't ignore the blank, and that's my professional opinion.
Q. And to be clear, we confirmed yesterday that you began working on this matter in 2004. Do you recall that?
A. Yes.
Q. And in 2004, you went to the--excuse me. I will strike that--you issued some reports. In 2013, you commented on LBG's data; correct?
A. I believe so, yes.
Q. By 2013, you were aware of the 2008 Guidelines; correct?
A. Yes, I was.
Q. And LBG's data validation was not performed under the 1999 Guidelines but was performed under more recent Guidelines, was it not?
A. Yes, it was, under the validator's report, that is the methodology that they relied on, yes.
Q. And you invalidate part of LBG's data applying the

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12:00 1 1999 Guideline; correct?
2 A. No, actually I invalidate the--because the
3 validators relied on the 2008 Guidelines, I then relied on
4 the 2008 Guidelines. These were the Guidelines that were
5 presented in their validation report. So, using these
6 results, many of the results were following these
7 Guidelines. So the rejections that they generated were
8 acceptable within these Guidelines, but there were a number
9 of rejections that they failed to identify that were not
10 within these Guidelines--
11 I'm sorry, let me just repeat that.
12 They didn't reject certain compounds in their
13 samples that were within these Guidelines, and that was my
14 issue with that, so I adopted these because that's what the
15 validator was using, so I had to compare--it was unfair for
16 me to compare my Guidelines to Guidelines that they had
17 already documented and stated that they had relied on.
18 Q. And that very explanation you just gave me is
19 nowhere in your Reports, is it?
20 A. I'd need to look at my Report for that.
21 MS. WOOD: Excuse me, counsel, I apologize for
22 interrupting you.
23 Just to be clear on the record, we did not receive
24 Ecuador's third-party data validation for its 2014 data
25 until after Dr. Douglas's January 2015 Report. It was

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12:01 1 agreed by the Parties that the data would go in, and it is
2 25--I believe it's Record Number 2514 as to when that data
3 validator report was provided and then put into the
4 record--I believe it was March of this year, so he would
5 not have discussed LBG's third party data validator report
6 for the 2014 data in his 2015 Report.
7 MR. GARCÍA REPRESA: Right. And I'm just told
8 that he had that data for the 2013 Report. He had the LBG
9 data. And what I want to be clear about is when you, in
10 2013, tested the LBG data, you applied the 1999 Guideline;
11 correct?
12 MS. WOOD: Well, objection. Note lack of
13 foundation as to the 2013 data.
14 PRESIDENT VEEDER: If you're going to get into
15 this, take it a little bit more slowly.
16 MR. GARCÍA REPRESA: Sure.
17 PRESIDENT VEEDER: He didn't have the Report which
18 came after his Report, but you say he got the data before,
19 ask him about when he got the data and then we will work
20 backwards.
21 BY MR. GARCÍA REPRESA:
22 Q. Yes and we can maybe just take the 2013 Report, if
23 you wish, at Page 1.
24 MS. WOOD: And Mr. President, I want to be clear
25 on the record, I am not disputing that we received their

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12:03 1 2013 validated--their third-party data validator's report
2 for the 2013 data prior to his 2015 Report, but we did not
3 receive the 2014 validated--third-party validators' report
4 until after his 2015 Report went in, and I hope that is
5 understandable to you.
6 PRESIDENT VEEDER: You made it very clear. Thank
7 you.
8 MS. WOOD: Okay, thank you.
9 MR. GARCÍA REPRESA: Thank you.
10 BY MR. GARCÍA REPRESA:
11 Q. So, to be clear, in your 2013 Report, I believe we
12 went through yesterday, you were asked to comment on the
13 chemistry opinions issued by LBG and Dr. Short; correct?
14 A. On what page, sir?
15 Q. I'm looking at the introduction of Page 4, for
16 example, on the bottom?
17 A. Page 4, 213?
18 Q. Right.
19 A. Yes, I see Page 4. What section are you referring
20 to?
21 Q. LBG had--did two field trips in 2013--
22 PRESIDENT VEEDER: Stop a second. Just help me,
23 where are you reading from?
24 MR. GARCÍA REPRESA: Excuse me, at the bottom I'm
25 reading--excuse me, it's Paragraph 1, 2, 3, and 4 after the

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12:05 1 introductory title: "Because of my many years of
2 experience, I will review the environmental chemistry
3 opinions of Mr. Goldstein and Dr. Short that relate to
4 analytical methods and the validity, reliability and
5 integrity of the Concession Area environmental data."
6 MS. WOOD: Mr. García Represa, I apologize for
7 interrupting, but I just want to be clear for the Tribunal,
8 his June 2013 Report was written prior to our receiving any
9 of LBG's data, so he would not have been commenting on
10 LBG's data in his June 2013 Report.
11 MR. GARCÍA REPRESA: I appreciate, dear colleague.
12 I will make it clear, if I'm just allowed to walk through
13 the documents with the Witness so that we are clear about
14 the scope of his work.
15 PRESIDENT VEEDER: Well, you are making a point
16 about the timing, and are you moving away from that?
17 MR. GARCÍA REPRESA: No, I'm going now to the 2015
18 Report.
19 PRESIDENT VEEDER: Okay. Let's see where it goes.
20 BY MR. GARCÍA REPRESA:
21 Q. So, in your 2015 Report, you defined at the very
22 beginning on Page 1, the Scope of Work and qualifications,
23 and there you say at the very top paragraph, you were asked
24 to evaluate the environmental chemistry expert opinion by
25 Dr. Short and to review the integrity and validity of

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environmental data collected by Ecuador's environmental expert, LBG, during the 2013 and 2014 field investigations; correct?

A. Yes.

Q. So, when you did the data validation process for your latest report, you had the LBG field data collected in 2013 and 2014; correct?

A. I believe so. I believe so, yes. It says 2013-2014.

Q. Okay. That, I think, is clear.

Now, we can go back, if we can go back to where we were, Tab 23, we were looking at the 2008 Guidance from the USEPA, and I was at Page 112.

A. Yes.

Q. And we were looking at what happens with quantitation limits.

Now, I put it to you that what we see in Table 31 is that where the blank result is below the quantitation limit--the CRQL--and the sample result is equal to or above the CRQL, what these Guidelines call is for professional judgment; is that correct?

A. So if the--

Q. I am looking at the--if you look at the blank result.

A. Right. I see it.

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Q. I apologize. Go ahead.

A. I see it.

You're saying here that if your blank is below the CRQL and you have a sample greater than the CRQL, you would use professional judgment, yes.

Q. And that professional judgment will require you looking at what the intended use of the data is?

A. The professional judgment would require you to deviate from standard practice, which in my opinion would be the 5X rule. And if you use professional judgment, I believe under ISO rules in terms of identification of the definition of "professional judgment," you would need to justify it in your Report. So, when the validators use professional judgment, they need to tell you what they're doing, why they're doing it, how they interpreted the data and why they selected the methodology that they used contrary to standard practice. I couldn't find that in their Report, unfortunately.

Q. What we can see also in here, if you now go to the row immediately below is that where the blank results, excuse me, is above the CRQL, so even in that scenario, if the sample result is equal to or greater than the quantitation limit and the blank concentration, you can still use professional judgment, can you not?

A. Let's make sure we understand what we're looking

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at here because this table is very complicated.

If your blank is greater than the CRQL--and we're going to go within that box, we'll go to the last line where it says "and your sample result is greater than the CRQL and greater than the blank concentration, use professional judgment." And in this case, the professional judgment was the 5X rule that the validators used, the standard practice.

Q. And all of that depends on what quantitation limit you actually use; correct?

A. That's right, as identified by a laboratory or as a J value, which a J is generally indicative of a value below the quantitation limit.

I should point out, too, sir, that if you look at the blank result for the value where your blank is less than the CRQL, so the blank is below that CRQL, but your sample is also less than your CRQL, there is a requirement here that is not professional judgment that says report the CRQL value with a U. Now, a U means not detected. Now, in the 1999 version, I would have used the 5X rule. So, in some cases, I may not have rejected a value within that criteria because the method blank--the sample may have been greater than the method blank even below the CRQL.

In this case, you have no choice. It says here report the value of the CRQL value with a U. That is not

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detect. And I think that is the most important change between the 1999 version and the 2008 version. They provide you with the option of using professional judgment for--in two situations which need to be documented, and they require you to reject the values where your blank is less than the CRQL and the sample is less than the CRQL, rather than ignore the blank and just report it--you would report that sample as a J had you ignored the blank, a J being an estimated value.

Q. I would like to speak now about natural organic material.

You said yesterday during your direct that LBG's data is biased high because it incorrectly identifies natural organic material. And for everyone's interest, I will just refer to that as NOM, N-O-M.

A. That's one term we use, NOM, or just plant matter.

Q. Okay. It's easier, NOM, if you don't mind?

A. Okay. NOM works for me.

Q. Okay. So, you said that LBG's data is biased high because it includes NOM as petroleum hydrocarbons in its results.

A. And again, most aggressively with the TEM analysis.

Q. Now, to set the premise, would you agree with me, would you not, that in soils in the Oriente, NOM would

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12:13 typically represent a few hundreds parts per million?
A. Absolutely not.
Q. And would you say that it can get as much as to a thousand parts per million, that's a thousand milligrams per kilogram?
A. NOM as measured by TEM can get as high as 26,000 milligrams per kilogram. NOM can get as high--can get into the thousands of milligrams per kilogram.
Q. And we will get to that figure of 26,000 because I understand that it relates to a specific sample that has been discussed in these proceedings; correct?
A. Only one example. There is multiple examples.
Q. Now, if we can please go to Tab 25, the bundle we were using. Now, you should normally find there a Judicial Inspection Report for Sacha 6. And you should have, so that there is no issue, both the original in Spanish at the beginning and, separated by a blue-colored page, the English translation.
And before we move on, do you recall having authored an appendix to this JI Report?
A. I have to find the English version.
Q. Well, if it may assist you, you will see in the English there's Bates numbers at the bottom right. And if you look at the Bates numbers, I'm interested in page--the page that finishes with 912, bottom right corner.

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12:14 A. Unfortunately, I don't have Bates numbers.
Q. It's after--it's towards the end of your document. You should have the Spanish version followed by an English version at the end. And if not, we can have someone assist you.
We will have someone assist you.
A. No, I see--
Q. You have it?
A. I see that.
Q. Okay.
A. It's separated by a blue tab here.
Q. Correct.
A. Okay.
Q. And if you look at the bottom right corner at Page 912, you should normally--we didn't print it all because it's humongous. It's about a bit more than 6,000 pages, I'm told, in the PDF file. Now, beginning at Page 903, we can see an Appendix G; correct?
A. Yes, 903, Appendix G.
Q. Correct.
And you will it has two items there, G.1 and G.2, and G.1 is your Report, Douglas G.S., 2004--that's a Report you authored; correct?
A. Yes. Yes.
Q. And if you turn the page, you will see that we

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12:16 actually have your bio and your signature on that, Page 905; correct?
A. Yes, this is my Report.
Q. Okay. So, if you now turn to Page 912 in the English version, at the bottom we find your recommendation in relation to Sacha 6. And you could you please read for the record the paragraph right below the "recommendation."
A. Well, in terms of these soils--and I have to make sure we understand that there is a huge difference between soils and sediments in terms of the amount of organic matter they may have present--but "in terms of these specific soils that have not been impacted by petroleum are clean may contain a few PPM to as much as a thousand PPM TPH that is not related to or caused by petroleum. When evaluating TPH, the following steps should be taken to minimize false positives and an overestimation of environmental risk at the site."
Q. Okay. Do you stand by that opinion, sir?
A. Well, for these samples, if there was an indication that there was a--they had no indication of petroleum and they had a 10,000 PPM TPH value, then I don't remember or recall these samples specifically, but it's possible in these samples that a thousand PPM would be very reasonable for background contamination of--at this site.
Q. Okay. And during your direct presentation

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12:17 yesterday, you said that that NOM can be identified by its characteristic fingerprints; do you recall that?
A. Yes, I do.
Q. And you showed us Slide 17. You can take--you are most welcome to go to that Slide 17.
Now, in that slide, I understand that you were showing to us, and I will just use the acronym, the GC/FID chromatogram; correct?
A. And for crude oil and for plant matter, in sample SSF13-SE002, yes.
Q. And you said that the image on the right--and I'm asking you to confirm if there's anything that we didn't say, that's incorrect, we have the technical jargon--just, feel free to correct me.
A. I understand.
Q. I understand you said the image to the right is a typical distribution of plant matter, and you referred to, and I will be reading what you said, that the peaks represent plant waxes and that they produce alkanes C27, 29, 31, 33.
Do you recall that explanation you gave?
A. Well, yeah. I recall that. The purpose was to show and to discuss the fact that plants produce odd-chained waxes. So, I didn't mean that they only produced those odd chains. They produce 21, 23, 25--they

produce a whole range of odd-chain plant waxes. They also produced, at lower concentrations, some even-chain plant waxes. And that's one piece of information you can use to identify that you have plant matter present in your sample.

Q. And that is precisely what I wanted to understand with you, that the--is it your testimony that we can identify in a chromatogram whether we are dealing with only plant matter when we see that the odd-numbered alkanes--21, 23, 25, et cetera--show higher concentrations, significantly higher concentrations, than the even alkanes? Is that a fair characterization?

A. So, what you're asking me is that, just based on the fact that you have those odd-chained alkanes in your sample, does that mean there is only plant matter in your sample?

Q. Let me rephrase the question. And we may look, if you wish, at the same document you were looking at, now--Bates Number 920.

Are you with me, sir?

A. Yes.

Q. So, at the very bottom of your Report here from 2004, we see a Figure 10, chromatogram of plant waxes in a pre-industrial sediment sample, and we have a chromatogram where we see peaks at 25, 27, 29, 31, and 33; correct?

A. That would suggest that plant material was present

in that sample.

Q. Okay. But when you say "suggest," you have no certainty. Is that what you want to express?

A. No. When we see plant waxes such as these odd-chained plant waxes, they generally indicate the plant material is present. It doesn't mean that it's 100 percent plant material, but it is an indicator, among others that we use, others being the boiling range of the sample between C16 and C31, information such as that; the lack of PAHs, for example.

So, you use multiple parameters when you're making that analysis.

Q. And I'm now showing on the screen that same Figure 10 we were looking at, and we superpose what's in red so it's clear.

Is it normal or is it typical of plant matter to have a bell-shaped form with the--in the alkanes between the 25 to the 33 range?

A. It's depending on the plants. We have such a diversity of plants in the Oriente. I have seen many distributions of various odd-chained plant materials that don't necessarily have that bell-shaped pattern.

Q. Okay. And to be clear--and I would like you to confirm--C28 is the end of the DRO, otherwise, diesel range organics; correct?--and C36 is the end of what we call the

extended diesel range; is that correct?

A. That's one definition, yes. C35, the C36 range.

Q. Okay. And that is relevant because of what we will be covering now. If we can go to your Slide 17 again, in the image we have plotted where the C28 to C36 range should go.

A. I'm sorry.

Q. Yes. You can look at your--your slide is maybe of better quality. We read on your slide, where you see the arrow that says C28, diesel range organics.

Do you see that?

A. Yes.

Q. And where we see the C36, we have extended diesel range organics; correct?

A. I'm not so sure that that identification indicates the range itself, but it might be a function of the gas chromatogram that puts it somewhere in the middle.

Q. So, where would you--

A. I don't know--this is not my gas chromatogram--but what I would be interested in looking at...

(Pause.)

A. I'd need to--I mean, if you have the alkane standard for this, I can just compare--overlay the alkane standard and tell you exactly what that range is in that chromatogram.

Q. Right. I'm sure we can have that conversation afterwards. For now, I just have your slide. So, we will have to work with that, if we can.

A. Um-hmm.

Q. If not, we will move on.

A. Okay.

Q. Would it be fair to say that with plant matter, somewhere in between these two arrows, we should find peaks with the odd alkanes?

A. I would say that generally you would see them between C16 to C35.

Q. And can you tell me what the peak is of right up to the C36. What are we seeing there?

A. Well, I can't, because it's a gas chromatograph. And in a gas chromatograph, you don't have--it's not like a GC/MS where you can actually identify those compounds.

I'm sure that if you would have provided me with the bar chart for the GC/MS, I could identify them with high accuracy.

Q. Okay. I would like to discuss now the last point for the day in this scenario--I hope we can have a conversation if you wish afterwards--which is the issue of weathering that you mentioned in your presentation also yesterday.

And in particular, I want to be looking at your

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12:26 2013 Report at Page 14. And I'm looking at the very top paragraph which begins "in addition to."
And there you--
A. I'm sorry, the top of Page 15 or 14?
Q. It should be 14.
A. Okay, thank you.
Q. There you said that, in addition to the simple examination of the gas chromatograms--so, what we were looking at a moment ago--you said that, "for the identification of biodegradation, quantitative measurements were made for each study to calculate the percent of each compound class that was lost from the fresh oil using modern generally accepted methods for detailed characterization of crude oil contamination."
Do you see that?
A. Yes.
Q. And the text between the inverted commas cites to an article by yourself; correct?
A. Sixty.
Q. And it's in the prior page. I do not know why that footnote--
A. Yes, it does.
Q. And--
A. I'm sorry, 60. 60.
Oh, yes.

1749

12:28 Q. And that, to be clear, is the only source that we have for the "modern generally accepted methods" that you refer to in this paragraph; correct?
A. That's the only one I referenced here.
Q. Okay. And we can go to that, if you wish, at Tab 29.
Now, we look at the top of this document, we see various authors mentioned. I understand all of them were, at the time of this article, employees of NewFields; correct?
A. That is correct, yes.
Q. And if we look at the abstract, what you are describing in this article is what you called "a new and rapid quantitative approach;" is that right?
A. Yes.
Q. Do you recall the date of this article?
A. I would have to look at the bottom.
It was published in 2012.
Q. That was about eight years after you had begun working in this matter; correct?
A. Yes.
Q. Do you recall who funded this article?
A. It says in the back that--the Acknowledgments--it says--
Q. Page 8286?

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12:29 A. That's right. It says "this research was funded by Chevron Corporation. We are grateful to the reviewers of the manuscript for their contribution to the technical and editorial quality of this work."
Q. So, the Claimant in these proceedings funded that article you're citing in 2012; correct?
A. Yes, that is correct. They provided--it was the data that was generated as part of the JI biodegradation program.
Q. And they funded the work.
A. They funded the work.
Q. They paid for that article, did they not?
A. Well, I don't know how much I paid for or how much they paid for, to be honest with you. It took me a while to write it and I did some of it on my own time.
Q. They paid something for that article?
A. I believe so, yes.
Q. Now, as to weathering, and you described it as "the physical processes of evaporation and solubilization." And also you described biodegradation as "the next step in the weathering process."
Do you recall that?
A. Well, can you point me to where you are reading it?
Q. I was just trying to connect the dots with your

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12:30 direct presentation yesterday?
A. Okay.
Q. Where--and for the Tribunal's convenience, it's at Page 1630, Lines 16 to 18 of the Transcript from yesterday's.
But--
A. Okay.
Q. I was trying to just conceptually--I was trying to conceptually make sure that we all are on the same page.
Would you say that weathering is the physical processes that include evaporation, solubilization and biodegradation?
A. Well, it's a generic term that's used in our business. Sometimes it's used to explain physical processes such as evaporation and biodegradation, and sometimes you include biodegradation within the general term. So, it's--it's the way it's used.
Q. Okay. Well, I'm going to be using biodegradation.
A. Okay.
Q. It speaks more to me.
And would you say that biodegradation depends on five principal factors, which are temperature, the presence of bacteria, the presence of nutrients, the supply of oxygen, and the surface area of the oil compared to the volume of the oil; is that correct?

A. I think those are some of the major factors.
Now, was the first one bacteria?
Q. Temperature.
A. Oh, well, bacteria--you need bacteria, too, to do this.
Q. That was my second one.
A. Oh, I'm sorry. Okay.
Q. Okay. And I would like to focus now on oxygen.
A. Yes.
Q. Now, would you agree that where oxygen is absent, hydrocarbons will either not decompose or decompose slowly?
A. I would agree that in the absence of oxygen, that hydrocarbons would decompose slowly.
Q. And would you also agree that the availability of oxygen decreases in soils with the depth of the column; correct?
A. I haven't personally measured it at the site, but if you're talking about an impacted site where oxygen is being consumed by the biodegradation process, then you would expect the oxygen to become depleted.
Q. And let's now go to a real example.
In a pit in the Ecuadorian Oriente that has hydrocarbons in it, would you agree that the availability of oxygen is lower at the lower depth in that pit?
A. Is this a soil pit or a pit filled with oil and

water or something?
Q. Let's say that it's a pit that has crude in it that was covered by a clean layer of soil. Would the availability of oxygen be lower with the depth at the deepest end of that pit?
A. I would expect there to be less oxygen deeper in that situation, yes.
Q. And therefore, it will also be normal for the crude that is found at the deepest end of that pit to be less weathered than the crude at the higher end of the--closest to the surface end of that pit; correct?
MS. WOOD: Objection. Incomplete hypothetical.
BY MR. GARCÍA REPRESA:
Q. Well, let's take a look at Tab 32, if you will. This is a report that you authored in April 2005 in relation to the Sacha Central Production Station.
Do you recall that? And this, just for the record, is part of Attachment 2 to your 2013 Report.
A. Yes.
Q. Now, if you can please go to Page 9, we have a table with the results of the testing; correct?
A. Yes.
Q. And we have on the left column the various samples. We have in the second column the chromatographic features. The third column is the weathering state;

correct?
A. Yes.
Q. Now, that weathering state, to be clear, is based on the scale developed by Kaplan and Galperin; correct?
A. Yes.
Q. And we see, as we go to the right, your calculations of the percent depletion depending on the carbon ranges that you're looking at; correct?
A. That is correct, yes.
Q. Now, I would like to look at the very bottom line, that--and I'll ask you to confirm--is my understanding is the deepest sample collected within the pit Number 2; correct?
A. The bottom line for JI-SAC-PIT2?
Q. Yes.
A. Okay. Yeah. According--well--
Q. Is 2.2M the depth?
A. Yes, but interesting enough, there is another sample, JI-SAC-EST-SI-2.2 depth as well, so...
Q. EST means Estación, doesn't it?
A. I don't know what these mean, so--I don't--I just report the data.
Q. Would you agree with me that pit means pit?
A. Oh, yes. If that means pit, then, so, it says pit--so, SAC-PIT--okay--1 is--okay, 1 is just the pit. It

doesn't seem to say--it seems like it's a different pit, is what I'm saying. I don't think these seem to be the same samples.
Q. Right. There are some--the top one's taken at Estación, the three right below at Pit Number 1, and the bottom one at Pit Number 2; isn't that correct?
A. When you say Estación, what do you mean?
Q. Your Report is Sacha Central Production Station.
A. Okay.
Q. Station in Spanish is Estación.
A. Okay.
Q. It simply means--I understand--
A. Thank you. I'm sorry.
Q. No problem. So, just to wrap up, if you go to the very last page of these documents, we are now looking--and excuse me, we will have to do that--we are seeing two pits being tested here, okay? Pit Number 1 and Pit Number 2.
ARBITRATOR LOWE: Page 13?
BY MR. GARCÍA REPRESA:
Q. At Page 13, which is the very last page, you have a figure where you compare the percent DRO (diesel range organics) and TPAH (Total Petroleum Aromatic Hydrocarbons) depletion of Sacha Central crude oil in Pit Number 1; correct?
A. Percent depletion versus soil depth, yes.

Q. And the vertical axis is the percent of depletion and the horizontal axis is the soil depth; correct?
A. Yes.
Q. And what we can see, especially in the blue line, is that as depth increases, depletion decreases; correct?
A. In these samples at this site, yes, that's correct.
Q. Would you say that that's a general feature in pits, that the deeper you go, the less depleted the crude is?
MS. WOOD: Objection. Incomplete hypothetical.
MR. GARCÍA REPRESA: I would--
PRESIDENT VEEDER: Let's see if the Witness can answer. If the Witness can't, then the Witness can say so.
MS. WOOD: Certainly.
THE WITNESS: Well, conceptually, that may be the case, but you really do need to measure each pit and compare the results depending on the qualities and the characteristics of every pit.
BY MR. GARCÍA REPRESA:
Q. Do you recall how many of these Reports you included in Attachment 2 to your June 2013 Expert Report?
A. I'm sorry?
Q. Yes. The Report I was showing you is just one--
A. Right.

Q. --Report that you did in 2005.
A. Right.
Q. Do you recall how many more of these Reports you enclosed with Attachment 2 to your June 2013 Report?
A. This was just an example of those. I didn't--
Q. Um-hmm.
A. For example, we didn't always have samples that were related to each other where we had maybe a surface sample or a depth sample. And if we had, we would be looking at it to see how that changed with depth.
Q. So, we could expect to see graphs like this one in the other Reports?
A. If we had--well, it was--this presentation was an evolving process. I think most of the Reports would include everything up to Page 12. And then when we started to look at it more deeply, we started to generate some figures that would provide the JI Expert additional information regarding, you know, if we had two samples that we knew were, in fact, from the same pit, the same location, then we would provide them with that information.
Q. Thank you, sir.
MR. GARCÍA REPRESA: And I have no further questions.
PRESIDENT VEEDER: Thank you very much.
It's 20 to 1:00. We could break for lunch and

come back at 20 to 2:00, or we could continue with the re-examination. But give us some estimate of how long you might be.
MS. WOOD: I don't think I will be very long, Mr. President, but it would be nice to have a lunch break now, if that's possible.
PRESIDENT VEEDER: Well, we could certainly do that, but very long means...
MS. WOOD: Fifteen minutes. 15, 20 minutes.
PRESIDENT VEEDER: Why don't we come back at 20 to 2:00.
MS. WOOD: Thank you.
PRESIDENT VEEDER: Thank you.
(Whereupon, at 12:40 p.m., the Hearing was adjourned until 1:40 p.m., the same day.)

AFTERNOON SESSION
PRESIDENT VEEDER: Let's resume.
There will now be questions from the Claimants.
MS. WOOD: Thank you, Mr. President.
REDIRECT EXAMINATION
BY MS. WOOD:
Q. Dr. Douglas, just a few questions for you.
Could you turn in the binders that Mr. García Represa handed out to Tab 23, the 2008 National Functional Guidelines at Page 112.
A. Yes, I have it.
Q. And you discussed with Mr. García Represa the chart that is on Page 112?
A. That is correct.
PRESIDENT VEEDER: I'm sorry, just pause a second. 112?
MS. WOOD: It's Tab 23, Page 112, Mr. President.
BY MS. WOOD:
Q. And could you explain to us--I believe you called it the BJ rule in your direct testimony, and looking at this chart, can you explain the BJ rule to us?
A. Sure.
Within the chart there are a number of actions for samples. As you can see, some of them have different types of reports, including no qualification, report CRL value

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01:41 with a U or use professional judgment.
With regards to the BJ rule that I was discussing in my presentation, I was referring to the situation where, if you look at the top of the table, where it says "less than CRQL," and then you go over to your right just below not detected, it says less than CRQL. What that means, if the blank is less than the CRQL and the sample result is less than the CRQL, then you report the CRQL value with the U, and U means not detected.
Q. And, Dr. Douglas, if I might stop you there for a minute, where it says, "actions for samples," the Report CRQL value with a U, is that a professional judgment, or is that a mandatory requirement?
A. That's a mandatory requirement.
Q. Okay. Let me turn you back to Slides 34 through 36 of your direct presentation.
A. Yes.
Q. And I believe you used this as an example of the application of this mandatory requirement in the 2008 National Functional Guidelines.
And before I ask you to demonstrate how this Rule applies, can I first ask you, did LBG's data validators for its 2014 data, did they apply this mandatory rule when validating LBG's data?
A. No, they did not.

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01:43 Q. Okay. Can you just walk us through what you mean by "application of the BJ rule"?
A. If I had a pointer, that would be helpful, but that's okay.
What I mean is if you look at the yellow compounds represent the compounds that are used to calculate carcinogenic PAHs, quantify carcinogenic PAHs in the sample, and you can see that on Page 34, the U values stand for "not detected," so those PAHs were not detected in the sample. However, the lab flags for the other PAHs, like the top one, benzo (a) anthracene, chrysene, Indeno(1,2,3-cd)pyrene and 1-methylnaphthalene, those are all associated with BJs, and what that indicates is that the sample had a blank problem, and it was present at less than the quantitation limit, which would fall within the 2008 National Functional Guidelines as a U or not detected.
Q. And, Dr. Douglas, I believe we've gone to Slide 35, which reflects the U, the non-detect in lieu of the BJ that the LBG data validators had flagged the data with.
A. That's correct.
Q. And what does that mean when you put the U?
A. That means that that analyte was not detected.
Q. Okay. And then if you go to Slide 36, can you just briefly describe Slide 36.

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01:45 A. Slide 36 basically shows you all of the analytes that were not detected and shows that Ecuador's Expert used non-detect data in their risk-assessment calculation.
Q. Thank you.
Moving to a different topic, if you could turn to Slide 17 of your direct presentation, you were asked a number of questions by Mr. García Represa about this slide, and you were requesting the alkane plots in order to interpret this chromatograph further. Do you recall that discussion?
A. That is correct.
Q. Okay. First off, can you just explain the methodology, the multistep methodology, you used in determining whether a sample contains plant matter.
A. It's a four-step process. The first process would be to look at the GC/FID chromatogram.
Q. Is this what we have in front of us?
A. Yes, it is.
And it provides a pattern that is not petroleum-related, but indicates plant matter.
The next process would be to look at the GC/MS data for the alkanes, and this is a highly precise and highly quantitative analysis of the distribution of the alkanes, those normal alkanes in the sample that I was speaking about before, and what we would see in this

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01:46 situation was there was a distribution that was dominated by those odd alkanes characteristic of plant matter.
Q. Now, let me ask you--
A. I'm sorry.
Q. Go ahead.
A. The third step would be to then look at the PAH data and to evaluate the PAH data because we often use Polycyclic Aromatic Hydrocarbon information to identify the presence of oil in samples, so we looked at the PAH data to determine if it was, in fact, a valid result, and we found that all of the--I would say the vast majority of target compounds were rejected because of blank problems. So, there was no information with regards to the PAH data to indicate that petroleum was present.
And then the final step would be to examine this biomarker concentration, so distributions in the sample where we looked for those biomarker distributions and see if they were present or not. Now, the presence in this case for this sample, there were no biomarkers present in this sample, so based on all of the evidence, the material that was present in the sample is plant material.
And another point I want to make while I have an opportunity, is that even though the GC/FID does report some plant material, it clearly does not reflect the entire amount of material that's present when you extract that

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sample and weigh it gravimetrically, you know. When you measure that residue and just weigh it, it includes many other larger compounds and polar compounds that are not detectable by GC/FID, yet they are still plant material and they end up in the TEM.

Q. And, Dr. Douglas, on Slide 17, the chromatograms that are depicted there, is that something you created, or does this come from the LBG data?

A. Oh, I'm sorry, this is from the LBG data report.

Q. Okay. If you could turn to Page 18 in your 2015 Report, and just very briefly, I would direct you to Figure 14 on Page 18.

A. Yes.

Q. Is this the alkane distribution plot that you were referring to as one step in your multistep process?

A. Yes, it is.

And you can see the alkane distribution from C17 to C36, indicating that those major components are, in fact, odd alkanes. They're odd-chained molecules. That is a clear indication of the presence of plant matter in your sample.

Q. And then if you would turn to the prior page, Page 17, in your 2015 Expert Report.

A. Yes.

Q. Is this the PAH distribution plot that you were

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referring to as one of the steps in your multistep process of determining whether a sample contains plant matter?

A. Yes, it is.

And you can see from this distribution, that the method blank in this sample is clearly similar to that of the concentrations of PAHs as detected in this sample. And therefore, if you apply the 5X rule to this, the vast majority of target compounds would be rejected.

Q. Now, Dr. Douglas, I'd like to turn to a different topic very briefly, alkylated-PAHs.

Mr. García Represa asked you a number of questions about alkylated-PAHs, and may I get you to turn to Page 9 of your 2013 Report.

A. Yes.

Q. And I would direct you to the bottom of Paragraph B on that page.

A. Yes.

Q. What is your understanding of whether Ecuador's oilfield regulations require analysis for alkylated-PAHs?

MR. GARCÍA REPRESA: Objection. Beyond the scope.

We have not discussed at all--and I'll be happy for you to point me to the record--Ecuadorian regulations during the cross-examination of this Witness.

MS. WOOD: Mr. President, may I respond?

PRESIDENT VEEDER: Of course, yes.

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MS. WOOD: There was quite a lengthy discussion with this Witness about alkylated-PAHs, whether to analyze for alkylated-PAHs, did he--did the Analytical Plan require analysis for alkylated-PAHs. I think it's important for the Tribunal to see, as set forth in Dr. Douglas's 2013 Report, that the Republic of Ecuador does not require analysis for alkylated-PAHs, so I think it's highly relevant to the Tribunal, given the cross-examination, the lengthy cross-examination, that Mr. García Represa made of this Witness about alkylated-PAHs.

PRESIDENT VEEDER: You may reply.

MR. GARCÍA REPRESA: Thank you, Mr. President.

I maintain the objection, and I will add that we saw, when we were interrogating Dr. Connor, that any questions relating to regulations were objected to on the ground that it would lead to a legal conclusion, and that was not put--that should not be put.

PRESIDENT VEEDER: That's not what I think is the objection.

MR. GARCÍA REPRESA: Well, I understand there's been a presentation being made in the question with which we disagree about Ecuadorian regulations. If the question that's being put to this Expert is whether Ecuadorian regulations require A or B, that calls for a legal conclusion in our view, and we have that same objection

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levied against our questions to Dr. Connor.

So, I think the fairness will require that these sort of legal questions not be put to an expert.

PRESIDENT VEEDER: Yes, I don't think that's where the questioner is going. If you want to add any other objection?

MR. GARCÍA REPRESA: No, that's it, Mr. President.

(Tribunal conferring.)

PRESIDENT VEEDER: The way you formulated the question invited the response, and if it was a question about what a regulation means or the effect of a legal regulation, we would stop you. But from the way you explained your question, I suggest you rephrase it, and we're minded to allow it for the time being.

MS. WOOD: Thank you, Mr. President.

BY MS. WOOD:

Q. Dr. Douglas, in your experience as an analytical chemist and having reviewed regulations to know what is necessary to develop a Scope of Work, what is your understanding of what the Ecuadorian--whether the Ecuadorian 1215 requires, if you were putting together a Scope of Work--

MR. GARCÍA REPRESA: I would object.

PRESIDENT VEEDER: I think you're getting into the same trouble again.

01:54
MS. WOOD: Okay.
PRESIDENT VEEDER: Just forget about regulations and ask a more open question. Can you do that?
MS. WOOD: I could do that, yes, sir.
BY MS. WOOD:
Q. Dr. Douglas, what is your understanding of whether alkylated-PAHs in general are required in doing any type of regulatory analysis?
MR. GARCÍA REPRESA: I would--
PRESIDENT VEEDER: Take out the word "regulatory." "Analysis."
MS. WOOD: Analysis.
THE WITNESS: Okay. My understanding is that the 16 priority pollutants are the primary PAHs that are used for those types of analysis, and those are what are requested, generally not the alkylated ones.
But in addition, my understanding is that, of the PAHs that are required within the Ecuador--by the Ecuador Government is that they require only six of the 16 that we actually measured.
BY MS. WOOD:
Q. Thank you.
If I could turn you to Tab 25 in the binder, Mr. García Represa's binder, and I would ask you to turn to the section that Mr. García Represa discussed with you on

01:56
Bates GSI 0640912.
MR. GARCÍA REPRESA: Excuse me. I'm sorry to interrupt. I'm just lost, Tab 25? Okay. Got it.
MS. WOOD: That's okay. I was lost the first time you raised it, too.
THE WITNESS: I'm sorry, Tab 25, and the Bates Number?
BY MS. WOOD:
Q. It is GSI Bates 0640912.
A. Yes.
Q. And this was a discussion that you had with Mr. García Represa about whether background of TPH from plant matter could be as high as 1,000 PPM. Do you recall that discussion?
A. Yes.
Q. Okay. Now I'd like to direct you to Slide 20 of your direct presentation.
A. Yes.
Q. Are these examples of where you have seen background or basically natural material in TEM samples much higher than 1,000 PPM TPH?
A. Yes.
Q. And what's the range that you have--you present here?
A. The range I presented here was from 1800 up to

01:57
44,000 milligrams per kilogram.
Q. Thank you.
Just one more document.
We're going to pass out an exhibit to LBG's 2015 Report.
MR. GARCÍA REPRESA: Can you point me to which exhibit?
MS. WOOD: They're handing it out right now.
MR. GARCÍA REPRESA: No, no, which exhibit in the LBG 2015 Report.
MS. WOOD: It's 30, RE-30 LBG exhibit.
MR. GARCÍA REPRESA: Thank you.
BY MS. WOOD:
Q. And let me ask you, Dr. Douglas, what is--
MR. GARCÍA REPRESA: Excuse me. I understand RE-30 is a reference to the Report itself? What is this reference to this particular document?
MS. WOOD: LBG does not provide exhibit numbers. It was submitted to their Expert Report. This is the Enbridge spill, the Kalamazoo study that was--
MR. GARCÍA REPRESA: No, no, I know what it is. I'm just wondering whether it was actually attached to the report or not. If you say that, it's fine. We can check it, and we won't object.
MS. WOOD: Yes, it was.

01:59
MR. GARCÍA REPRESA: Thank you.
BY MS. WOOD:
Q. Let me ask you, Dr. Douglas, what is this document?
A. This is a letter to Mr. Ralph Dollhopf, who is the Federal On-Scene Coordinator and Incident Commander for U.S. EPA Region 5, Emergency Response Branch, in Traverse City, Michigan. He was in charge of the emergency response to the Kalamazoo River oil spill in Marshall, Michigan.
Q. And what was your role in this project with EPA in Kalamazoo River?
A. I was the senior forensic scientist for the Federal On-Site Coordinator and Incident Commander.
Q. And the first document in this package I believe is where EPA is writing you accepting all of your recommendations for an Analytical Plan.
A. That is correct.
Q. Okay. And then what is attached to this document is the recommendations that you had made to EPA in your role as advisor to EPA as far as the Analytical Plan that you were recommending?
A. That is correct.
Q. Now, would this document--first off, the document is dated what?
A. 2/10--February 10, 2012.

Q. Okay. And would this document have included quality control requirements that you were recommending to EPA for the project?
A. Yes.
Q. Okay. Let me ask you to turn to, it's Table 6.1(a), Page 21 in your recommendations?
A. Yes, I have that page.
Q. And if you go down about ten rows, do you see the reference to procedural blank?
A. Yes, I do.
Q. Okay. And what is meant when you have a procedural blank here? Can you tell us what is meant by procedural blank in comparison to the discussion that you had in your direct testimony and with Mr. García Represa.
A. Sure.
Procedural blank represents the laboratory blank that I presented in one of my figures. It's on Figure 22, and it represents the laboratory blank that would be run with every analytical batch of samples.
Q. And in this line, I'm assuming this is your recommendation to EPA as to how they should handle their laboratory or procedural blanks?
A. That is correct.
Q. Okay. Can you compare the recommendation you made to EPA for blank--

(Fire alarm and off the record.)
PRESIDENT VEEDER: I hope it's safe to continue.
(Laughter.)
MS. WOOD: Thank you. Let me re-ask my question.
BY MS. WOOD:
Q. In your recommendations to EPA in the Kalamazoo River, I guess, three years ago, you made recommendations on how to--what is the criteria for analyzing blanks and how that would impact samples that were being collected in that project, and what I'd like you to do is to compare for us the recommendation that you made to EPA as their analytical chemist advisor, compare that with the criteria that you applied in this case to the LBG data.
MR. GARCÍA REPRESA: And I would just caution against leading questions.
MS. WOOD: Thank you.
MR. GARCÍA REPRESA: I am not objecting to this one, but I want you to do this or that is not appropriate.
PRESIDENT VEEDER: I think there has been a lot of guilt from the beginning of this Hearing, but if you can avoid it, it's obviously more credible if it's not too leading.
MS. WOOD: Thank you.
Do you want me to re-ask the question?
PRESIDENT VEEDER: It would probably be wiser if

you tried, yes.
MS. WOOD: Okay.
BY MS. WOOD:
Q. Dr. Douglas, how does your criteria for blank comparison to field samples, how does that compare with what you--the analysis that you applied to LBG's data?
A. It's the same. It basically involves that if an analyte is detected in the associate samples--first of all, it says that, "no more than two analytes can exceed five times the MDL," so that would raise a flag and create a quality control issue; and unless the analyte was not detected in the sample, so if you found it in the blank but you didn't find it in the sample, no problem.
The second part of this is all the concentration of that material is greater than five times the blank value, so it basically is a 5X rule application to the method blank.
So, if the material that's in the sample is greater than five times whatever is in the blank, then you would reject that sample, which is the same approach I used in my analysis.
Q. Thank you, Dr. Douglas.
MS. WOOD: No further questions, Mr. President.
PRESIDENT VEEDER: Thank you very much. We've come to the end of your testimony. We have no questions

for you.
THE WITNESS: Thank you. Thank you very much.
PRESIDENT VEEDER: You may leave the table.
(Witness steps down.)
PRESIDENT VEEDER: Now, before we move on to the next witness--
(Fire alarm.)
PRESIDENT VEEDER: This will take less than three minutes. Again, to call upon our Secretary to the Tribunal to announce the time spent by the Parties so far and the time left before we come to the time for closing oral submissions.
Just to recap, we have another five witnesses, two from the Claimants and three from the Respondents, which will require as experts direct examination, cross-examination, and possibly re-examination.
Martin.
SECRETARY DOE: Sure. By my calculations, the Claimants, excluding opening, have used nine hours and 26 minutes so far, and the Respondent has used 25 hours and 37 minutes so far, which, working on an average of 5.5 hours a day, leaves 18 hours and 4 minutes for the Claimants and one hour and 53 minutes for the Respondent.
I'd be happy to be corrected in my calculations.
PRESIDENT VEEDER: Now, we need to address timing.

I don't want to do this now because I wanted to make people consider their respective positions and whether these timings are challenged, but obviously we have a potential problem. So, I think when we finish at the end of the day, we're going to revisit the question of timings. So, let's call for the next witness.

MS. RENFROE: Thank you, Mr. President. Let us take a moment to get him and his materials in.

PRESIDENT VEEDER: Well, let's take our usual five-minute break.

MS. RENFROE: Thank you.

(Brief recess.)

PRESIDENT VEEDER: Let's resume.

MR. SILVA ROMERO: Before the examination commences, Mr. Bloom has an issue he wanted to raise with you now.

PRESIDENT VEEDER: Mr. Bloom.

MR. SILVA ROMERO: Thank you.

MR. BLOOM: I'm sorry to inject now, but obviously timing is an issue for us beginning with this Witness, so I think we do need to address it now.

Mr. President, for our part, we never actually reached an agreement with respect to a chess clock, and if so, what the percentage was going to be. The only agreement that we had reached with Claimants' counsel was

what witnesses would be going on what day so that we could finish this Hearing in an orderly process and on time. So at least for our part, we've kind of tried to stick to the schedule and then budget it in order to stick to the schedule and, therefore, have not been timing, so your comments kinds of took us very much by surprise.

PRESIDENT VEEDER: I noticed.

We're going to address this after we hear these witnesses. We ought to find a solution, but obviously we have a limited time before we have to come to the end of this Hearing. You both wanted, I think, next Wednesday free to prepare for your closing oral submissions. This doesn't affect the closing oral submissions, but we've got Friday, Monday, and Tuesday to complete all the expert evidence, and so I think we do need to be very careful about the clock from now on, but let's address that later.

MR. BLOOM: And I can assure you because I have paying attention to make that sure we're finished on Tuesday. We'll be good on that front, but the issue will be whether or not there is an allocation of time that we were unaware of, but if the concern is whether we're going to finish on Tuesday, we will finish on Tuesday. There is one caveat we should talk about, but we can do that later.

PRESIDENT VEEDER: Let's come back to all this later.

Keep your powder dry. You can address this later.

THOMAS E. MCHUGH, CLAIMANTS' WITNESS, CALLED

PRESIDENT VEEDER: We have before us the next expert witness, Thomas E. McHugh.

What we'd like you to do first if you would is to give us your full name and then to read the words of the Declaration requested of all expert witnesses at this Hearing.

THE WITNESS: Okay.

My name is Thomas Eric McHugh.

I solemnly declare upon my honor and conscience that I shall speak the truth, the whole truth, and nothing but the truth, and that my statement will be in accordance with my sincere belief.

PRESIDENT VEEDER: Thank you very much. There will be first questions from the Claimants.

MS. RENFROE: Thank you, Mr. President, Mr. President and Members of the Tribunal.

DIRECT EXAMINATION

BY MS. RENFROE:

Q. Dr. McHugh, can you tell the Tribunal what is your area of expertise?

A. My area of expertise is toxicology and human health-risk assessment.

Q. What was your role in the Lago Agrio Case?

A. My involvement in the Lago Agrio Case began in 2003, and I worked on a number of issues early on, but my primary role has been human health-risk assessment.

Q. And in this arbitration case, have you prepared a series of reports?

A. Yes, I have.

Q. Generally, what has been the subject matter of your Reports?

A. In general terms, my Reports have focused on human health-risk assessment.

Q. And to be clear, and for the record, your First Report is September of 2013?

A. That's correct.

Q. And then you prepared a Second Report of May 2014?

A. That's correct.

Q. And a Third Report January 2015.

A. That's correct.

Q. And just to make sure that everyone has a copy of your Reports, we have distributed those to the Tribunal and to our colleagues from the Republic of Ecuador.

And so, if anyone doesn't have a copy those reports, please let me know, but I'll ask you this question now.

Do you have any corrections to these Reports?

A. No.

Q. And do these Reports reflect accurately and completely the opinions you have formed and the testimony that you have given in this arbitration case?

A. Yes.

Q. Now, have you prepared a presentation to explain your testimony?

A. Yes, I have.

Q. And with the permission of the Tribunal, I would ask Dr. McHugh to make his presentation.

PRESIDENT VEEDER: Please.

THE WITNESS: Thank you. I appreciate the opportunity to appear here in front of the Tribunal this afternoon.

My name is Thomas McHugh. I'm going to talk about my quantitative human health-risk assessment for the Petroecuador-Texaco Concession Area.

I'm just going to start with just a little bit about my background, I'm a toxicologist, I have a Ph.D. in toxicology from the University of Washington. I'm a board-certified toxicologist with the American Board of Toxicology.

I have been working in the environmental consulting field for 20 years, working on a wide variety of projects, including toxicology and human health-risk assessment, but also including site investigation and site

cleanup.

As I mentioned, I have been working on the Lago Agrio Case since 2003, and in 2008 I prepared a Quantitative Risk Assessment Report on the Concession Area that was submitted to the Court in the Lago Case.

In addition to my consulting work, I have worked on a variety of research projects and I've published findings from those research projects in a number of peer-reviewed scientific journals. My research projects have included collaborations with university Professors, with State environmental regulators and with USEPA regulators.

So, my presentation today is going to start with an overview of human health-risk assessment as it's applied to contaminated sites.

Next I am going to talk about my quantitative risk assessment and explain how I reached my conclusion that residents in the Concession Area do not face a risk from the Concession Area conditions related to petroleum activities. And that evaluation, as I said, was originally presented in a 2008 Report that was submitted to the Lago Agrio Court. It was also addressed in Mr. Connor's 2010 Report and in my 2013 Report that was submitted to this Tribunal, and the 2008 Report was an attachment to my 2013 Report.

I'm going to finish my presentation discussing my concerns with Dr. Strauss's risk assessment, and my concerns regarding her assessment have been documented in my 2013, 2014, and 2015 Reports that have been submitted to this Tribunal.

So, starting with an overview of the quantitative risk-assessment process, this process is defined in a variety of regulatory guidance documents such as documents developed by the USEPA, and these documents establish a four-step process for evaluating risks at a contaminated site. That involves hazard characterization, toxicity assessment and exposure pathway analysis and risk characterization.

The hazard characterization is the site investigation part of the process. That's going out to a site, collecting samples and having those samples analyzed by a laboratory in order to measure the concentrations of chemicals at the site. The toxicity assessment involves evaluating the toxicity of those chemicals that are found at the site. And for the regulatory process, the toxicity is intentionally overestimated in order to provide a very high level of protection for people who are potentially accessing the site.

The exposure pathway analysis involves evaluating how people might be exposed to chemicals present at the

site.

And then the risk characterization combines the results of the first three steps into an overall evaluation of whether or not site conditions present a risk to people who could be at the site.

I'm going to talk a little bit more about the toxicity evaluation because that's a critical part of the risk-assessment process. It's a tenet of toxicology that all things can be poisons. The short saying is: The dose makes the poison. That is any chemical can be harmful if you're exposed to the sufficient dose. So an example is alcohol. If you consume 20 beers in one night, that will have severe health effects, but if you consume 20 beers over an extended period of time, one beer a night, that will not have adverse health effects.

So, when we are evaluating a contaminated site, we need to understand the toxicity of the chemicals that are being evaluated. That toxicity is evaluated through laboratory animal testing. The laboratory animals such as rats or mice are exposed to different amounts of the chemical in order to evaluate the toxicity. We start with a very high amount of the chemical that will result in severe health effects, that's like the 20 beers that I mentioned or it's like a person jumping off of a 5-meter ledge. Either of those will result in severe effects. The

test animals are also exposed to lower concentrations of the chemicals that have minor effects, would be analogous to consuming two beers or jumping off of a 1-meter ledge. A lot of people jumping off a 1-meter ledge will be just fine. Some people may sustain minor injuries, such as spraining an ankle.

Animals are also exposed to lower concentrations of the chemicals that have no adverse effects. That would be like consuming one-quarter cup of beer or stepping off of a 10-meter step. Either of those is a safe activity.

So, by testing these different concentrations of chemicals or different amounts of chemicals with the laboratory animals, we find this level that has no adverse effect on the animal. And then for the regulatory process to assure a very high level of protection, we add additional safety factors. Those safety factors could be ten or up to 1,000.

And the effect of that is that we observe that the 10-centimeter step was safe, but we now set the safe level as 1-centimeter or as low as .1-millimeter step or just one drop of beer. Well, we say that's safe. And for the risk-assessment purpose, we assume that anything above that could be of a concern and would require additional evaluation.

So, in applying the risk assessment to a

contaminated site, we combined this toxicity evaluation with the hazard characterization and the exposure analysis, and combine those into a single value, often a hazard index, and we use that as our decision threshold. If the hazard index is below one or below this 1-centimeter step that is very safe with this safety factor.

So, if we're below that hazard index of one, we can conclude with a very high degree of confidence that there is no health risk and, as a result, a cleanup is not needed to protect health. If we're above this 1-centimeter level, we cannot conclude that there is an actual health impact or even a significant health risk. We can only conclude that we're in this zone of uncertainty, we're above the safety factors that have been established, and we need some additional evaluation to better understand the conditions.

That's an overview of the risk-assessment process. I'm going to discuss my quantitative risk assessment for the Concession Area and explain how I reached my conclusions that the conditions are not a concern for local residents, not a health risk.

So, I applied this four-step process that I just described, the first step of which is the hazard characterization. I haven't been down to the Concession Area myself, so for the hazard characterization, I relied

on the investigations that were completed as part of the Judicial Inspection process that you've already heard a lot about. In my risk assessment, I utilized all of the data that was collected as part of that Judicial Inspection process. That included the Chevron Pre-Inspection results. It included the Chevron and the Plaintiff Judicial Inspection results that were collected under Court supervision, and it included the samples that were collected directly by the Court Experts in the case.

This resulted in a dataset that included approximately 2,400 soil samples or sediment samples or other solid samples that had been collected from the Concession area. And it included approximately 1,200 surface water, groundwater or other drinking water samples. So, this dataset was collected from 56 different Judicial Inspection sites that were included in this inspection process.

The samples were analyzed by a variety of methods and Dr. Douglas talked about some of those methods. For the risk-assessment purpose, the first two methods that Dr. Douglas discussed are simply, in my experience, never utilized for evaluating petroleum risks. And so those two are grayed out on this slide.

The remaining analytical methods can be used to evaluate risk at petroleum sites, but the different methods

provide different amounts of information for evaluating those risks. The methods that have been referred to as TPH methods measure--give you a total petroleum number, and they give you less information for evaluating risks. The individual compound analysis methods tell you the precise concentration of individual chemicals that are in the petroleum mixture, and that's the most specific information for evaluating risk.

As I described my overall process, I'm going to try and illustrate it with specific examples so it's easier to follow along in how the process was implemented. And so this slide shows a photograph illustrating--showing the collection of two samples that were included in my risk assessment. This is a photograph of the Guanta 6 site, and it shows a spring at this site that's used by the local residents for washing laundry.

The Chevron sampling team had a policy of testing every water resource that was identified as being used by the local residents during the inspection process. So, during the Chevron Pre-Inspection, this Chevron technician sampled the surface water and the sediment from this spring. There was no evidence or complaints of petroleum contamination in the spring, but it was tested because it was being used by the local residents.

So, the next step in the process is the toxicity

assessment, and that's evaluating the toxicity of the individual chemicals. And so, what are the individual chemicals? For my risk assessment, I included chemicals that are indicative of petroleum risk, so that included BTEX, four volatile compounds, you've heard about the gasoline portion of crude oil, and these are the four risk chemicals associated with the gasoline portion of petroleum, benzene, Ethyl benzene, toluene, xylenes.

I also included PAHs which are the risk chemicals for the less volatile portion of petroleum, and I used the 16 priority pollutant PAHs that have been identified by the USEPA.

Now, metals are not strongly associated with crude oil, but they can be associated with oil production activities, and so I included ten metals for completeness. So, in total, I evaluated 30 individual constituents to evaluate risks associated with oilfield contamination.

For the toxicity assessment, I used screening values developed by the World Health Organization and the USEPA. In the reports that I have submitted to this Tribunal I used screening values that were developed in the timeframe of the TexPet cleanup program that you've heard a lot about, and those screening values provide a consistent framework for evaluating conditions associated with that cleanup program. As part of my assessment, I've also

considered more recent screening values. Those values are similar to the ones from the 1990s era, and consideration of those values does not change my evaluation in any way.

These screening values assume a high level of toxicity. They incorporate this overestimation of toxicity that I've talked about, and they assumed that exposure will occur to the sampled locations; and, as a result, these screening values are appropriate for application of a wide variety of contaminated sites.

And so the screening value in this case is this decision criteria that I talked about, that the level that's equivalent to the 1-centimeter step--it's a very safe concentration. So, in looking at an individual sample, if the constituent concentrations are below these risk-based screening values, then with a very heightened degree of confidence, we can conclude that it's not a risk. If the concentration is above the screening level, then that sample location requires additional evaluation to understand potential risks.

So, for the 3,600 samples that were collected during the Judicial Inspection process, 97 percent of those samples had no--none of these 30 constituents with concentrations above the risk-based screening levels. Three percent of the samples had at least one constituent that was above the risk-based screening value and that

required additional evaluation.

So, for the additional evaluation, I move to the exposure pathway analysis, and for those samples that had constituent concentrations above the screening level, I considered, at that sample location, a potential for contact with soil or sediment or ingestion or other uses of the surface water or well water.

And as I will explain, this exposure evaluation indicated no locations with unacceptable risk.

So, how did I reach that determination? This slide illustrates one of those evaluations that I did. This is a sample that was collected, again during the Chevron Pre-Inspection program, from the Shushufindi Southwest Production Station, and the sample location is shown by the yellow diamond that is on the aerial image there. That yellow diamond is adjacent to a petroleum pipeline. The pump symbol is the Shushufindi 71 well site, and the pipeline carries the petroleum over to the Shushufindi Southwest Production Station for processing at that station.

During the Pre-Inspection, the Chevron sampling team collected a sample from the location shown by the yellow diamond, and that sample had benzo(a)pyrene at 3.4 milligrams per kilogram, which is a concentration above this risk-based screening level.

COURT REPORTER: Repeat that number, please.

THE WITNESS: I'm sorry. That sample had a benzo(a)pyrene concentration of 3.4 milligrams per kilogram, which was above--yes.

PRESIDENT VEEDER: You are beginning to speak quite fast, if you could just keep in mind, try and speak a little bit more slowly.

THE WITNESS: Yes, I will try to do that. Thank you.

So, this sample had a benzo(a)pyrene concentration above the screening level, and so I needed to evaluate the specific circumstances of that sample. As I said, I haven't been down to the Concession Area, so I evaluated the circumstances of this sample by reviewing the available reports such as the Pre-Inspection Reports, the Judicial Inspection Reports, and I also consulted the individuals who had been down to the Concession Area, such as the Court-appointed Experts, and the other members of the sampling team who were down there.

And what I learned from this sample is that this was an asphaltic material, it was associated with pipeline spills that were reported in 1996 and 2000 during the period when Petroecuador's operating the Concession area, but the material had weathered to this asphaltic state, so it was a solid material. And when crude oil weathers to

this solid state, the chemicals in the crude oil are bound up in this solid matrix. And so, it's like an asphalt road. An asphalt road can contain benzo(a)pyrene and other PAHs, but you can be exposed to the asphalt road without being exposed to those chemicals because the chemicals are bound up in the solid matrix. And because of that, I concluded this location was not a risk concern.

I performed a similar evaluation at other sample locations that had risk exceedances, and other reasons why those locations did not present a risk included samples that were collected from below ground where they had a clean soil cover above them that prevented exposure. Some samples were collected within the active Production Station, a location where the residents are not allowed access, so the residents could not be exposed to locations within the active Production Station.

Other samples were collected in remote locations, such as within a swamp, that could not be routinely accessed by the residents.

So, my overall risk characterization based on this evaluation, I concluded that there is no evidence of risk to residents living in the Concession Area, that's based on this evaluation I discussed, that 97 percent of the samples have no constituents above the screening levels. For the remaining 3 percent of samples, the locations of those

samples are such that there is not an exposure concern for the residents.

So, I'm going to finish my presentation by discussing my concerns with Dr. Strauss's risk assessment.

Dr. Strauss has submitted three Risk Assessment Reports to the Tribunal. Well, I think four Risk Assessment Reports to the Tribunal. In her first risk assessment, she presented no quantitative evaluation of the Concession conditions. In her Second Risk Assessment Report, she presented the results of two different evaluations such that she presented two different conclusions for each location she evaluated. In her Third Risk Assessment Report, she added an additional four evaluation methods such that she presented six different conclusions for each location that she evaluated. And these different conclusions were based on different laboratory methods for measuring petroleum in a sample and three different evaluations of how toxic the crude oil is. And she matched up the different methods with different toxicity evaluations to come up with six different answers.

And she presents these evaluations in a table on Page 20 of her 2014 Report, and that's shown here, and the table is fairly complicated, so I am going to try and walk through it carefully.

The first column of her table lists the six sites

that she evaluated in 2014, and at each site she evaluated between one and four individual locations, and those locations are described in the second two columns, but the results of each evaluation are shown on each individual row, so there are 16 rows of results corresponding to the 16 locations she evaluated.

She utilized this hazard index approach such that the decision criteria is always tied to a value of one. One corresponding to this 1-centimeter step that's very safe. So, in her evaluations where her hazard index is below one, below this 1 centimeter very safe level or this one drop of beer, very safe level, she indicates those with a white cell, so the white cells are her evaluations that these locations are very safe. If she determined a hazard index above one, above this 1-centimeter step or one drop of beer, indicating that some additional evaluation is required, she colors those cells, and those are her locations that her evaluation indicates require additional evaluation.

So, you can see scanning across individual rows, she reaches very different answers for the different methods that she utilizes.

And what I would like to explain to the Tribunal is that her Method Number 1 is the only method that was conducted in a manner consistent with an established

regulatory framework. It's the only evaluation method that you can look to a written document and step through the process that she used. Her methods three--her Methods Number 2 through 6 all depart from established regulatory frameworks in a way that increase her risk estimates.

And this use of six different methods is problematic because the answers that she gets using these different methods vary quite dramatically. So on this slide I'm showing one of her evaluation locations from the Shushufindi 13 well site, and using her Method Number 1 that was conducted in accordance with an established framework, she gets a very low risk value, 0.02, which is well below this 1-centimeter step that's very safe. Using her Method Number 6, she gets a value of 20 which is above this level of one and indicates a need for further evaluation.

Now, I'm going to discuss my concerns with her different evaluation Methods 2 through 6, starting with Method Number 6 and working backwards because Method Number 6 provides the greatest exaggeration of risk. And Method Number 6 is based on this TEM, Total Extractible Material, analytical method that you've already heard some about, that Measures a wide variety of organic constituents, and I'm going to illustrate the problems with that analytical method through the sample that was

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collected at the Shushufindi well site SW004 and SE004, that's a surface water sample and a sediment sample. And this photograph from LBG shows the stream that was targeted for that sampling, and LBG doesn't indicate the exact location of the sample within this photograph, but you can see the stream running through the middle of the photograph. And based on the information provided, I think the sample was collected somewhere in the middle of the photograph.

So, the samples collected here were analyzed by LBG or their laboratory using a variety of TPH methods, and using this TEM method that measures a lot of materials other than petroleum, the laboratory reported a fairly high concentration: 39,000 milligrams per kilogram of total material. And assuming that if that was all petroleum, Dr. Strauss calculates a hazard index of 20 using her Method Number 6.

Dr. Douglas explained that this analytical method is particularly prone to measuring organic material that has nothing to do with petroleum; and, for this particular sample, the laboratory noted that this sample has a lot of plant material in it, and commented that, this sample, along with some others that they were looking at at the same time, had too many fine roots to remove.

When this sample is analyzed by a more reliable

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method and a method more suitable for evaluating petroleum risk, the laboratory reported a much lower concentration. Using the VPH/EPH method, they reported a much lower concentration of petroleum, 154 milligrams per kilogram. And when Dr. Strauss evaluated this result using her Method Number 1, the only method that's tied to a regulatory Protocol, she gets a hazard index of 0.02.

And so the risk evaluations conducted by Dr. Strauss using her Method Number 6 are unreliable in part because they use the TEM method which provides unreliable results regarding the amount of petroleum in a sample.

For her Methods 3 through 6, Dr. Strauss used a toxicity value that she developed on her own. When we conduct risk assessments, we always rely on toxicity values that are developed by regulatory authorities, and we do that because it provides a consistent framework for evaluating contaminated sites. And we do that because it provides a consistent framework for evaluating contaminated sites. It ensures a consistency from site to site. For Methods 3 through 6, Dr. Strauss departed from that practice and utilized a toxicity value that she developed on her own.

And she developed this toxicity value only for her Third Risk Assessment Report that she submitted in 2014.

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She developed the values specifically for this project. That is a method that is not accepted by regulators. To my knowledge, her toxicity assessment that she did in 2014 has not been applied to other sites and has not been peer-reviewed.

In doing this, she changed her position from 2013 when she only relied on toxicity values developed by regulatory authorities, which, as I said, is the standard practice in our field.

And, in addition, Dr. Strauss did not consider a 2008 Guidelines document issued by the EPA that establishes toxicity factors for petroleum that are to be used if you are evaluating the risk of petroleum using a TPH method.

So, that brings us to Method Number 2. And for Method Number 2, Dr. Strauss did use a regulatory guidance document, but the regulatory guidance document, the Louisiana document that she cites, establishes this method only for preliminary screening of a site. This evaluation method uses the 8015 analytical method that gives us very limited information about the petroleum, but it's less expensive than some of the methods that give us more detailed information. And because it's less expensive, the Louisiana guidance document supports its use for initial screening. But the Louisiana guidance document that I show on this next slide, it says if you have the more detailed

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TPH data and the more limited data, so the more detailed data is what they call the TPH fractionation data, and the more limited data that Dr. Strauss used for Method Number 2 is called the TPH mixture data, the Louisiana guidance document that Dr. Strauss cites says explicitly "management decisions shall be based on the fractionation data." And the guidance document says that because the fractionation methods more accurately characterize site conditions.

And in every case where Dr. Strauss utilized Method Number 2, she also had this more detailed information, the fractionation data that's specifically referenced in the Louisiana Guide, and that is Method Number 1. So, Method Number 1 is the only approach Dr. Strauss used that is consistent with regulatory framework, and it's the only method that should be considered by this Tribunal. If the Tribunal evaluates conditions in the Concession Area using Methods 2 through 6 presented by Dr. Strauss, the Tribunal will be creating a new precedent because these methods are simply not used to evaluate petroleum risk.

So, if you look at the results that Dr. Strauss obtained using Method Number 1, she evaluated 16 locations. And as I explained at the beginning of my discussion of her work, the white cells are the cells where she calculated a hazard index below one. That's a risk that's below this

very safe level of a 1-centimeter step or one drop of beer. And so at 13 of these 16 locations, Dr. Strauss found that the conditions are very safe.

At the remaining three locations--those are the colored cells on the table--she indicates that some further evaluation is merited. But when you look at each of these three locations, you find that there is not a current exposure at these locations that indicates an actual health concern.

I'm going to illustrate that by looking at just one of them. This is at the Aguarico 6 site. And so, here I show another aerial image. The green point is the wellhead itself, and the yellow diamond is the sample location. So, this is a water sample that was collected by LBG. It was collected from a monitoring well that they installed as part of their investigation process. There was no well at this location before LBG installed their sampling well, and it's a location with no nearby residences.

And so, I show a photograph that was provided by LBG showing this monitoring well location. This monitoring well was installed in a swampy area that has visible oil contamination. And so, Dr. Strauss calculated her risk value assuming that a resident would drink water from the location of this monitoring well at some time in the

future. And the fact is that nobody today is drinking water from this oily swamp, and so this is not a health risk today.

I think Dr. Strauss and I would both agree that this oily swamp should be addressed in accordance with Ecuadorian regulations that would require a cleanup of this swamp, but this swamp does not present a health risk.

I'm going to finish my discussion by briefly discussing Dr. Strauss's cancer-risk evaluation. I have many of the same concerns with her cancer-risk evaluation, but specifically her cancer-risk evaluation evaluates cancer risk based on eight individual PAH compounds that were measured in the samples collected by LBG. And Dr. Douglas explained some of the data quality problems associated with that analysis, specifically the same PAH compounds were detected in every laboratory blank sample that was analyzed by this laboratory. So, when the laboratory was sent--was provided with clean water, such as in bottled water, they found the same constituents in the blank samples.

And specifically for these PAHs, they were detected in the blank samples and also in many of the site samples at very low concentrations. There was a discussion of quantitation limits that I'm sure was a little bit difficult to follow, but for most of the samples that Dr.

Strauss included in her cancer-risk assessment, the PAHs were detected at these very low concentrations and also detected in the blank samples of these very low concentrations such that a proper data validation would have indicated that the concentrations in the samples from the site should be considered non-detect, and that was not properly accounted for in Dr. Strauss's cancer-risk evaluation.

In addition, Dr. Strauss did not consider other sources of PAHs. For the eight PAHs that Dr. Strauss included in her cancer-risk assessment, there are many other sources of these PAHs, including combustion sources--so, the PAHs can originate from cooking fires used by the local residents or from agricultural fires used to clear land. And Dr. Strauss did not consider these potential sources, particularly in the samples where these PAHs were detected at very low concentrations.

But regardless of these concerns, if you look at the actual drinking water sources that Dr. Strauss evaluated, in every case, even accepting her data at face value, the hand-dug wells comply with the World Health Organization drinking water criteria. That's both for individual constituents and for the total cancer risk.

So, Dr. Strauss's risk assessment, her overall conclusion is that there's widespread petroleum

contamination and widespread risk concerns. However, a closer examination indicates that her evaluation relied on flawed analytical methods that are not accepted for risk assessment. She utilizes a toxicity value that she created for this project, she assumed exposures that are not actually occurring, and these issues result in risk values that are exaggerated by as much as a thousand times.

In addition, I will point out that all of the locations she evaluated are locations that were outside of the TexPet cleanup program that you've heard about.

So, looking at my risk assessment and also an appropriate evaluation of her risk assessment, they both indicate no health-risk concern; and, as a result, the evidence that's in the Lago record and that has been presented to this Tribunal does not support the Judgment Award for a $1.4 billion healthcare system, an $800 million excess cancer Judgment, or a $150 million potable water system.

That's my presentation. I look forward to questions from the Tribunal and from the Ecuador representatives.

PRESIDENT VEEDER: Are there any more questions from the Claimants?

MS. RENFROE: No, Mr. President.

PRESIDENT VEEDER: We may have questions later,

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but we will now have questions from the Respondent.
THE WITNESS: Thank you.
MR. SILVA ROMERO: Thank you, Mr. President.
CROSS-EXAMINATION
BY MR. SILVA ROMERO:
Q. Good afternoon, Dr. McHugh.
A. Good afternoon.
Q. My name is Eduardo Silva Romero. I am one of the lawyers representing the Republic of Ecuador in this case, and I'm here to ask you a few questions if you agree.
A. Okay.
Q. You will be given a Cross-Examination Bundle, Dr. McHugh.
A. Okay.
Q. And we may refer to it from time to time to discuss about some documents.
A. Okay.
Q. I understand you know how these examinations proceed.
A. Yes.
Q. Dr. McHugh, first of all, I would like to discuss about your experience generally, and perhaps the best way to do it is to go to your CV, which is Appendix A to your 30th of May 2013 Report, I believe.
A. Yes.

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Q. I must say at the outset that I'm a bit confused with the dates because there are three dates on your Reports. On the first page you have 3rd of June as issued, then revised the 4th of September, then on the next page you have the date of the 30th of May 2013. I'm not making any argument or point on that, but I just want to agree on the terminology. We can refer to it, if you agree, to the September 2013 Report; is that correct?
A. Yes.
Q. All right.
MR. SILVA ROMERO: So, and for the Tribunal, you can also find this Report at Tab 1 of the examination bundle, if you prefer.
BY MR. SILVA ROMERO:
Q. The first question--
MR. SILVA ROMERO: Tab 2 of the examination bundle. Apologies.
BY MR. SILVA ROMERO:
Q. The first question I had regarding the CV, Dr. McHugh, is whether you're still a Vice President of GSI.
A. Well, so, Vice President--when I was first identified as Vice President with the company, it was because I was a Shareholder and a part owner of the company. And, at the end of 2012, I believe it was, I

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relinquished my ownership share in GSI because I was interested in reducing the amount of time that I invested in the company. So, I still carry the honorary title of Vice President, but I'm no longer an owner at GSI.
Q. So, if I understood your answer, you are still a Vice President of GSI; correct?
A. Yes.
Q. But you're no longer a Shareholder of the company; correct?
A. That's correct.
Q. And the President of GSI is, I understand, Mr. Connor; correct?
A. Yes.
Q. And he's a Shareholder, is he?
A. Yes.
Q. Right.
If we go to Page 2 of the CV, Dr. McHugh, from Page 2 onwards, you list what you call "representative project experience;" you agree?
A. Yes.
Q. And if I got it right, you break down this representative project experience into six different categories. I see, first, vapor intrusion; then toxicology and risk assessment; then--and I'm on Page 3 of the CV--course development and training; then on Page 4,

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education support; then on Page 5, environmental engineering; and the last category is on the next page, biochemistry and microbiology.
A. That's correct.
Q. Right.
Out of this representative project experience here that you set out, how many of those projects involved site investigations related to oil exploration and production operations?
A. I don't know. I would have to go through and count them individually. There's quite a number of projects listed.
Q. If I say more or less ten, will you agree with that?
A. I wouldn't dispute it.
I would--to give you a precise number, I would have to go through and look at each individual one.
Q. Right.
Well, the first category, as we mentioned a moment ago, of these projects is vapor intrusion; correct?
A. Yes.
Q. And from your CV, I got to the conclusion that you are an expert on vapor intrusion issues; would you agree with me?
A. Yes, I have done a lot of work on vapor intrusion,

yes.
Q. Could we say that this is your main specialty?
A. I wouldn't characterize it as my main specialty. I've worked on a number of vapor intrusion projects in recent years, but I've also worked on quite a number of other projects.
Q. If we come back to Page 1 of the CV, Dr. McHugh, the first section is the biographical summary.
A. Yes.
Q. And towards the end you say the following: "He is a principal investigator for two vapor intrusion research projects funded by the Department of Defense through their Environmental Security Technology and Certification Program Research Program. In addition, Dr. McHugh is a PI for another project, demonstrating technologies to reduce viability in groundwater monitoring data. He's the lead author on several peer-reviewed journal articles, peer-reviewed conferences, proceedings, and technical documents on vapor intrusion and other topics related to environmental site investigation and remediation."
So, when I read this paragraph, Dr. McHugh, I noticed that you underlined your experience on vapor intrusion issues.
Would you agree with that?
A. Yes. That's been an issue of--that's had a lot of

interest in the United States over the last several years, and I have done a lot of work in that area, so, that's one of the areas that I've highlighted, yes.
Q. And then if we go to page--I believe, 6 and Page 7 of your CV, Dr. McHugh, my impression reading the different publications that you list is that most of those publications are on vapor intrusion issues.
Would you agree with me, sir?
A. Many of them are, many of them are not.
Q. Right. But you agree that the majority of publications are related to the issue of vapor intrusion, would you not?
A. I couldn't tell you without going through and counting them.
Q. Okay. If we come back to Page 4 of the CV, on the top of the page you list some course development and training projects; correct?
A. Yes.
Q. And I believe it's the seventh project on this page, it is a risk-based corrective action training.
Do you see that?
A. Yes.
Q. And risk-based corrective action is what is called RBCA; correct?
A. Yes.

Q. And you describe this course or this project in the following way: "Developed and taught two-day training course on risk-based corrective action," and then you say, "key topics included overview of corrective action, environmental fate and transport, development of site-specific cleanup standards, remedy selection, monitored natural attenuation, and the use of RBCA software."
Do you see that, sir?
A. Yes.
Q. And I understand this RBCA methodology is the one you rely upon in your Reports; correct?
A. Yes.
Q. And this course that you list here, was it aimed at explaining the ASTM Standard Guide for RBCA applied at petroleum release sites?
A. Yes, that was the original focus of the course. This specific course was a course that was developed by myself and some other individuals at GSI. It sort of--it followed on and was similar to a course that was developed ASTM that explained the process that they developed. GSI developed a software tool called the "Rebecca toolkit" that helped users implement that evaluation process. And because we were offering the software product, there was also interest in training provided by GSI that described

both the ASTM process and application of our software. And so we developed this course, and I taught this course quite a number of times.
Q. And when you mention "Rebecca," this is RBCA; correct?
A. Correct.
Q. This is the way to mention in the business to refer to the RBCA system?
A. Yes, thank you for that clarification. We call it "Rebecca." "Rebecca" is sort of the pronunciation of RBCA.
Q. Well, I think we can agree to call it "Rebecca" because it's probably nicer; okay?
A. It's certainly easier, yes.
Q. All right. Let's call it "Rebecca" from now on.
On Page 1 of the September 2013 Report, Dr. McHugh, which is on Tab 2 of the bundle, you see the title on the top of the page is "a scope of engagement."
Do you see that, sir?
A. I'm not sure exactly where you're referring to.
Q. I'm sorry, Page 1. I'm sorry.
A. Yes.
Q. You see the title, 1, "Introduction."
A. Yes.
Q. Then 1.1, "Personal Qualifications and Experience."

A. Yes.
Q. In the second paragraph you say: "During my 20-plus years in the environmental industry, I have worked on hundreds of environmental risk assessment, environmental site investigation and remediation projects."
So, I take it from the CV that if you did ten-plus assessments in relation to sites where exploration and production of oil occurred, that's it, only ten?
A. No. My CV, as those headers you referred to indicate, they list representative projects for each category. So, the CV is not an exhaustive list of projects.
Q. Right. You didn't find helpful for this Tribunal to have all the list of the different oil production and exploration projects you had?
A. I simply included the standard copy of my CV.
Q. Right.
And I understand that all the projects concerning oil operations in which you worked--on which you worked occurred in the U.S.; correct?
A. That may be the ones that I listed on my CV. I've also assisted on some international projects.
Q. The ones I found in your CV happened in Texas and in California.
A. Okay.

Q. Okay.
Leaving aside this Chevron versus Ecuador Case, Dr. McHugh, have you undertaken any RBCA projects related to oil operations in the Amazon?
A. No.
Q. Have you undertaken any RBCA projects in Ecuador?
A. No.
Q. Have you undertaken any RBCA projects in South America?
A. Yes.
Q. Where was that?
A. In Mexico.
Q. Close to California and Texas, I find?
A. Yes. I guess--well, so, I guess Mexico is not South America. Mexico is North America.
Q. In 1830, California--
(Laughter.)
Q. Well, please strike that.
COURT REPORTER: Too late.
BY MR. SILVA ROMERO:
Q. Have you ever been in the Amazon rainforest, Dr. McHugh?
A. No, I have not.
Q. Very well.
Now I would like to turn to the Reports that you

have presented in this case. And I understand, Dr. McHugh, that you have presented five Reports which are in the record of this arbitration; would you agree with me?
A. I guess if you include the Report that was authored by Mr. Connor that I--where I assisted on the risk-assessment portion, then yes, five would be the correct count--five would be the correct count if you include the Report authored by Mr. Connor in 2010.
Q. Yes. So, Ms. Renfroe mentioned three Reports submitted for this arbitration, and you annexed to your First Report submitted in this arbitration the 2010 Report that you prepared with Mr. Connor, and your 2008 Report; correct?
A. That's correct.
Q. And I understand that the 2008 Report was prepared for the purposes of the Lago Agrio Litigation; correct?
A. That's correct.
Q. Do you recall how was the 2008 Report filed with the Ecuadorian courts?
A. I'm not familiar with the details of exactly how it was filed.
Q. Was it filed together with the Report of Mr. Connor?
A. My recollection is that my evaluation was included with--as a single report with a couple of additional

experts. It was sort of a package of three Reports. But to my knowledge, I mean, I don't know if it was submitted--how it was submitted in relation to Mr. Connor's Report. I just don't know.
Q. Okay. But I understand that in 2008, you served as an expert in the Lago Agrio Litigation before the Ecuadorian courts; correct?
A. That's correct. That's my understanding.
Q. And my understanding is that Chevron hired you to prepare and submit a report in 2008 for the consideration of the Lago Agrio Court; correct?
A. That's correct.
Q. And this 2008 Report provided a quantitative risk assessment of potential human health risk within the former Petroecuador-Texaco Concession Area; correct?
A. That's correct.
Q. And I understood that you say "potential" because, as a risk assessor, as a health-risk assessor, you are assessing risk in the future, and you are not actually establishing actual harms in the present time; correct?
A. You're correct that I'm not evaluating actual harm. I'm evaluating both current and potential future risk.
Q. Right. Now, in order to prepare your 2008 Report, you exclusively relied on Chevron's Judicial Inspection

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data; correct?
A. I quantitatively evaluated Chevron's Judicial Inspection data. I also considered the data collected by the Plaintiffs, but they had not provided to the Court or to Chevron representatives the data quality documentation needed to evaluate the quality of their data; and, as a result, I did not include their dataset in my quantitative evaluation in 2008.
Q. So, to be clear, you didn't include the Plaintiffs' Judicial Inspection data in your analysis of 2008; correct?
A. I considered it and did not include it in my quantitative evaluation.
Q. So, you didn't include it; correct?
A. I'm sorry? You're saying I did?
Q. You did not include the data taken by the Plaintiffs in the Lago Agrio Litigation.
A. I did not quantitatively evaluate it.
Q. Right. Now, in your 2008 Report, potential risks to human health were evaluated based on the RBCA process published by ASTM; correct?
A. That's correct.
Q. Will you please tell the Tribunal what ASTM stands for, Dr. McHugh.
A. ASTM stands for the American Society for Testing

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and Materials. It's a non-profit organization that brings together experts to develop procedures for a wide variety of activities. The procedures might include things such as the strength and specification of hardware, such as screws, you know, how much force can a screw take. But specifically here they have a group that develops standards for addressing environmental issues, and I utilized the standard that they developed for evaluating petroleum sites.
Q. Do you know who drafted this ASTM Guide?
A. It was a group. I don't recall the specific individuals.
Q. Right. I understand that in the group of members of ASTM there are industry representatives; correct?
A. Yes, there are typically both industry and government representatives.
Q. And obviously industry representatives include oil companies; correct?
A. That's correct--for issues that are of interest to the oil companies, yes.
Q. Right.
A. For issues related to the screws, probably not.
Q. Fair enough.
I understand, Dr. McHugh, that more specifically, for the purposes of the 2008 Report, you relied on the

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Standard Guide for RBCA applied at petroleum release sites; correct?
A. That was one of the documents I relied on, yes.
Q. And just to start looking at this document for the--and to facilitate access to it for the Tribunal, this guide is at Tab 9 of the bundle.
And is this the document we were discussing about, Dr. McHugh?
A. Well, this is equivalent to the document that I used in 2008, but you can see at the top here that this document was re-approved in 2010. So, this standard was originally developed in 1995, but the ASTM process requires that these standards be reviewed roughly every five years, and so they're reviewed by the same Committee that developed them originally to ensure that standards have not changed, to ensure that it's still a relevant and appropriate standard. And this standard has been re-approved a couple of times, most recently in 2010, but clearly that re-approval occurred after my Report.
Q. Probably in 2008 you relied on the document re-approved in 2002?
A. That's correct.
Q. And there is no substantial difference between the document re-approved in 2002 and the document re-approved in 2010; correct?

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A. That's correct.
Q. Now, maybe we can go to your 2008 Report, and more specifically to Page 49. And I understand that this document starts at Page 45 because there were other chapters in the original Report; correct?
A. That's correct.
Q. And on Page 49, the second paragraph says: "For this Report, the results from each Judicial Inspection site have been compiled and reviewed to evaluate the potential for exposure to petroleum-related contaminants. Potential risks to human health associated with such exposures have been evaluated based on the risk-based corrective action RBCA process published by ASTM and endorsed by USEPA and many other regulatory agencies worldwide," and you give the example of the Colombia Ministerio Ambiente; correct?
A. Correct.
Q. And you said earlier that you relied on the ASTM Standard Guide and other documents. I take it that the other document is more specifically the guide by the USEPA; correct?
A. That is one of--well, the EPA has a lot of guides, so, I'm not sure what you're referring to.
Q. We will come to it later. But you relied on some USEPA guidelines?
A. Yes.

Q. I understand, Dr. McHugh, that you also relied upon the ASTM Standard Guide of 2000 for RBCA; correct?
A. I believe I mentioned that guidance document. I don't think it was a central part of my evaluation process.
Q. Okay. And I understand that the difference between the 1995, as re-approved, Guide and the 2000 Guide is that the '95 Guide is specific to petroleum release and the 2000 is more general; correct?
A. That's correct.
MR. SILVA ROMERO: Looking at the President, I don't know, Mr. President, if you want to have a break.
PRESIDENT VEEDER: Let's have a break whenever it's convenient for you.
MR. SILVA ROMERO: I think it's now.
PRESIDENT VEEDER: Let's break and then we will come back at 25 to 4:00. But just give us some idea--
MR. SILVA ROMERO: Absolutely.
PRESIDENT VEEDER: How long you will be when you get back.
You can do it--tell us later. Don't tell us now.
MR. SILVA ROMERO: I believe probably half an hour, 45 minutes.
PRESIDENT VEEDER: Okay. Thank you.
So, we will break 15 minutes.
Please don't talk about the case or testimony away

from the Tribunal.
(Brief recess.)
PRESIDENT VEEDER: Let's resume.
MR. SILVA ROMERO: Thank you, Mr. President.
BY MR. SILVA ROMERO:
Q. Dr. McHugh, if we can go now to Page 49 of the September 2008 Report, please.
A. Okay.
Q. And towards the middle of the page, you see the title, "A Standardized Process to Evaluate Risk."
Do you see that, sir?
A. Above the header in the middle of the page or below?
Q. Well, it's a title--
A. Oh, it's the title itself, yes.
Q. Yes.
And then the first paragraph under that title towards the middle, says following: "The process consists of four main steps."
Do you see that, sir?
A. Yes.
Q. And I take it that you say, "main," because there might be more steps in a RBCA; correct?
A. There could be. I mean, these are the four broad categories, and there are certainly a lot of specific steps

within those four categories.
Q. So, I understand that each of the four steps may have different stages; correct?
A. That's correct.
Q. And you represent the four main steps at Page, I believe, 55 of the Report, and this is the Figure 2-5.
A. That's correct.
Q. And here we see the four steps that you mentioned in your direct presentation; correct?
A. Correct.
Q. Did you draw this table here?
A. This was drawn by support staff under my direction.
Q. Understood. You didn't take it from one of the guides we have been discussing about?
A. No.
Q. And, Dr. McHugh, you mentioned during your direct presentation that the first step is the source hazard characterization; correct?
A. That's correct.
Q. And I understand that this first step could also be called site assessment; right?
A. That's correct.
Q. And I also understand that the purpose of the site assessment is to identify contamination which could entail

risks to human health; correct?
A. That's correct.
Q. And my understanding is that, to undertake the site assessment, you may rely on different sources of information. For instance, you can rely on the history of the site; correct?
A. Yeah.
The source hazard characterization you should consider available information, yes.
Q. And some available information could be the history of the sites that you can find in some documents; correct?
A. That's correct.
Q. And I understand that you can also rely on interviews of people who know the evolution of the site; correct?
A. Correct.
Q. And in that sense, testimony from people who know the evolution of the site may be relevant in a RBCA; correct?
A. They may be relevant to provide a general understanding of the site.
Q. And obviously, the first step, the site assessment, also encompasses a sampling program; correct?
A. Correct.

Q. And during this first step of the RBCA, one, the assessor should select the chemicals of concern at the site; correct?
A. Yes.
Q. And the selection of chemicals of concern is based on the consideration of exposure routes, concentrations, mobilities, toxicological properties and esthetic characteristics such as taste, odor, and so forth; correct?"
A. I would agree for the human health evaluation, the esthetic characteristics is not necessarily relevant.
Q. Let's go to Tab 9 of the bundle, if you will, Dr. McHugh.
A. Okay.
Q. And this is a standard guide for RBCA re-approved in 2010, and if we can go to Page 14, one-four, of the document, towards the end of the page, you will find, Dr. McHugh, Article X1.4.1.
Do you see that Article, sir?
A. Yes.
Q. And towards the middle of this article, it is stated: "The selection of chemicals of concern is based on consideration of exposure routes, concentrations, mobilities, toxicological properties, and esthetic characteristics such as taste, odor and so forth."

Do you see that?
A. Yes, that's covering all of the constituents that would be involved in a comprehensive evaluation, including the human health-risk assessment, but the esthetic characteristics, taste, odor and so forth, do not directly relate to the evaluation of human health impacts.
Q. And you didn't take into account esthetic characteristics in your analysis, did you, sir?
A. For my evaluation of potential human health impacts, no.
Q. If we go now to Page 4 of the same document, which is again the RBCA Bible, you will find Article 4.5 on the left of the page. Do you see that, sir?
A. Yes.
Q. And it is stated here that, in order to properly apply the RBCA process, the user should avoid the following. And if you go to Article 4.5.10, it says, "neglecting esthetic and other criteria when determining RBSLs or SSTLs.
Do you see that, sir?
A. That's right, because the RBCA process includes the human health-risk evaluation and consideration of other criteria, these esthetic criteria.
Q. So, esthetic may be part of a qualitative risk assessment; correct?

A. It can be--it can be part of the quantitative assessment, but it does not relate directly to whether or not there is a human health risk.
Q. Esthetic can give indications as to whether there is need to obtain more information on a site; correct?
A. That's not what this is referring to here. This is referring to constituents that could affect the odor or other characteristics of the environmental media without posing a health risk. And so, as part of a comprehensive evaluation, it's pointing out that, in addition to evaluating health risk and in evaluating whether a cleanup is required, it's appropriate to include whether there are esthetic impacts that are unrelated to risk.
Q. Esthetic may be used to determine whether there are hydrocarbons on a site; correct?
A. Well, some hydrocarbons have odors.
Q. And, therefore, esthetic may be used as a starting point for a RBCA process; correct?
A. That's not what this is referring to. This is referring to conditions where there is a taste or odor impact that does not present health risk.
Q. Esthetic determinations, Dr. McHugh, can prompt the assessor to take more samples; correct?
A. It's not our standard practice in doing site investigations to rely on odor characteristics as a primary

method for identifying sample locations.
Q. If we go now to Article VI.1.2.9, which is on Page 5 on the left--on the right of page, VI.2.1.9 is the first article. VI.2.1 says, on the left, "The site assessment information for Tier I evaluation may include the following," and then VI.2.1.9, "a qualitative evaluation of impacts to environmental receptors."
Do you see that, sir?
A. That's correct. So, that's talking about the site assessment part of it, so that's the hazard characterization piece that we talked about, and a qualitative evaluation would be things like visual evidence of impacts, yes.
Q. And a qualitative assessment may be the first step of a site assessment; correct?
A. Well, I would agree that qualitative information is incorporated into the site assessment and can guide the site investigator to appropriate sampling locations.
Q. And then on the basis of these qualitative assessment, the investigator can then undertake a quantitative analysis; correct?
A. That's correct.
Q. And do you agree with me, sir, or don't you, that a site visit could be a qualitative risk assessment?
A. I'm not following you.

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Q. This Tribunal--maybe you don't know that, sir--this Tribunal will go to the Amazon to see four sites. You know that, sir?
A. Yes, that's my understanding.
Q. And I understand that site visit could be characterized as a qualitative risk assessment, could it?
A. No.
Q. They will look at some impacts in the environment.
A. Yes. I expect when the Tribunal goes to the Concession Area that they will be looking at the conditions.
Q. The second step of the analysis, Dr. McHugh, is what you call the toxicity assessment; correct?
A. That's correct.
Q. And as a layman, I understand this second step as the application of some relevant standards to the identified contamination to find out how toxic that contamination can be. Do you agree with me?
A. That's correct.
Q. And hence, the choice of the relevant criteria, what you call the health-based screening criteria, is essential. Do you agree with me?
A. It's important to select appropriate values, yes.
Q. And I understand that the main difference between you and Dr. Strauss is precisely the choice of those

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criteria; correct?
A. No, there are many differences that we have.
Q. And I understand that Dr. Strauss's criteria are more protective of human health than your criteria; correct?
A. No. I would say both sets of criteria are protective of health.
Q. If we go now to your First Report in the arbitration, the September 2013 Report, and more specifically to Appendix C--and let me see if I can find the page.
A. I'm sorry, which report are you referring to now?
Q. The September 2013 Report.
A. Okay.
PRESIDENT VEEDER: Might you be looking for the 2013 report, Appendix C?
MR. SILVA ROMERO: Correct. And more specifically C.1.2, but I don't see page numbers.
PRESIDENT VEEDER: It's forbidden.
Just give us the first line of the page.
MR. SILVA ROMERO: Yes. The first line of the page is, "Obtained from the USEPA integrated risk information system."
And towards the bottom of the page--
BY MR. SILVA ROMERO:

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Q. Are you with me, Dr. McHugh?
A. Yes.
Q. You say here, "For oil compounds for which the World Health Organization guidelines didn't provide numeric drinking water criteria, concentrations for the protection of human health were developed according to the procedures specified in the soil screening guidance issued by USEPA in 1996."
Correct?
A. Correct.
Q. And I understood from this sentence here that you didn't rely for this Report on the supplemental guidance of the USEPA of 2002.
A. That's correct.
Q. And if we can go, please, to Tab 14, which is the last tab of the bundle. This is the supplemental guidance for developing soil screening levels for Superfund sites?
A. Yes.
Q. Are you with me, Dr. McHugh?
A. Yes.
Q. And if you go, please, to Page--
MR. SILVA ROMERO: And again, the pages here are weird, Mr. President--
BY MR. SILVA ROMERO:
Q. It's Page 3-1, so you need to finish with the

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Pages 1, then the Pages 2, and then you have the Pages 3, and this is the first page of the three category, if I may say. 3-1. And the title on the top is, "Exposure pathways."
I understand that this supplemental guidance, Dr. McHugh, updated the 1996 guide you relied upon in 2013 in relation to specifically exposure pathways; correct?
A. That's correct.
Q. And towards the end of the one, two--third paragraph you can read the following at the beginning of the third paragraph: "This chapter updates the 1996 in three ways." And I am interested in the second, which says: "It presents equations for a combined soil ingestion dermal absorption SSL that includes a new quantitative approach for evaluating dermal absorption." Correct?
A. That's correct.
Q. And I understood from your responses that you didn't take into account this update of 2002; correct?
A. That's right. The 1996 guidance document says they did not include dermal absorption because at that time they did not have a procedure for it. The skin is a natural barrier to contaminants. The skin is designed to protect us from the environment, and so it's not a significant exposure pathway. In this 2002 guidance document, the USEPA does present a quantitative method for

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evaluating dermal exposure that intentionally overestimates the ability of skin to uptake contaminants, but even doing that, it has a very minor effect on the screening levels that they present, so that the change in screening levels from 1996 to 2002 is very small. And I've reviewed these 2002 screening values, and they do not change my evaluation.

Q. So, you had available this supplemental guidance, and you didn't rely upon it?

A. That's correct.

Q. The third step of the analysis that you made, Dr. McHugh, is the evaluation of exposure pathways; correct?

A. Yes.

Q. And I understand that the analysis at this stage is how and how often humans could be in contact with a contamination found to be toxic on-site; correct?

A. That's correct.

Q. I understand that in your methodology, first one has to analyze toxicity and then exposure pathways; correct?

A. That's correct.

Q. But I understand that you can change the Order of these two steps. You can first evaluate exposure pathways and then evaluate toxicity; correct?

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A. In my experience, the standard sequence is the toxicity evaluation followed by the exposure evaluation.

Q. So, you said, I believe, Dr. McHugh, that you didn't participate in the different inspections undertaken by Chevron in the Amazon; correct?

A. That's correct. I have not been to the Concession Area.

Q. So, you didn't visit the sites, obviously?

A. That's correct.

Q. That means that you didn't check yourself the different exposure pathways in the sites; correct?

A. That's--for my exposure evaluation, I relied on the Report documents that were generated, and I discussed the conditions with the members of the inspection team.

Q. So, you relied on what Mr. Connor told you; correct?

A. I've discussed the situations with Mr. Connor, with Mr. Baca, and with other individuals who have been down to the Concession Area and participated in those inspections.

Q. So, you interviewed the members of your team to know where to find exposure pathways in the different sites; correct?

A. That, combined with the documents that were generated, yes.

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Q. And the fourth and last risk-characterization step is actually, I understand, a conclusion of the analysis of the three first steps; correct?

A. That's correct.

Q. Dr. McHugh, you don't refer in your description of the four steps of the ASTM RBCA methodology to any of the different articles in the Standard Guide that we were reviewing, do you?

A. I'm sorry, what do you mean by the articles?

Q. There is no reference in your Reports to a specific provision, articles, recommendations that one can find in the guide of the ASTM that we were reviewing; correct? You don't understand my question?

A. I'm sorry, I'm still not following.

Q. You referred to the ASTM Guide in a general way, but you are not citing specific provisions in the text of your Report saying, "I am doing this in accordance with Article VI.2 of the ASTM Guide," for instance?

A. That's correct. That's correct.

Q. Right. And, therefore, I understand that the four steps that you put forward are actually your interpretation of the methodology that you find in the ASTM Guide; correct?

A. Well, my Report refers to both the ASTM Guide and other documents, and I believe that the four steps that I

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lay out are the four steps that are identified in the USEPA 1989 document.

Q. So, you rely on the ASTM Guide, or you rely on the USEPA Guide?

A. As documented in the Report, I relied on the combination of documents.

Q. Right. It's a combination of the guides, but you don't make any reference to the different articles or provisions in those guides; correct?

A. That's correct. I tried to describe the step-by-step process that I followed in accordance with these guides.

Q. Correct. Let's try to see the USEPA Guide to try to understand this combination, and this is at Tab 11 of the bundle. And if we go, for instance, to Page 1-7, you will find here Exhibit 1-2 which seems to describe the four steps that you mentioned in your Reports; correct?

A. Yes.

Q. And the difference is that the first step is called "Data Collection and Evaluation." Correct?

A. Yes.

Q. And if we go to Page 1-4, there is a title called, "Site Characterization."

Do you see that?

A. Yes.

Q. And I understand the site characterization is the first step in the RBCA process; correct?
A. That's correct.
Q. And if you start reading there, it says: "During site characterization, the sampling and Analysis Plan developed during project scoping is implemented, and field data are collected and analyzed to determine the nature and extent of threats to human health and the environment posed by a site."
Do you see that?
A. Yes.
Q. And if you go to Page 1.6--before, if you go back to Page 1.4, it says: "The major components of site characterization are collection and analysis of field data to characterize the site, development of a baseline risk assessment for both potential human health effects and potential environmental effects and treatability studies as appropriate."
Do you see that?
A. Yes.
Q. And I understand that you relied on the data collected by the team of GSI in the Amazon; correct?
A. I relied on the data collected by Parties working on behalf of Chevron. I relied on data collected by the Plaintiffs, and I relied on data collected by the Court

experts.
Q. In 2008, to prepare your First Report, you only relied, we established, on the data collected by Chevron; correct?
A. In 2008, the Chevron data collected during the Judicial Inspection process is the only data I evaluated quantitatively. The Plaintiffs' and Court Expert data was evaluated in the 2010 Report, and the PI data was evaluated in the 2013 report.
Q. And it is my understanding that Chevron's experts' sampling program was aimed at finding clean samples; correct?
A. The samples that were collected by Chevron through the Judicial Inspection process included all of the sample locations that were nominated by the Plaintiffs and instructed by the courts and the sample locations nominated by Chevron and instructed by the courts, so the samples collected by Chevron included samples within the source material, such as a closed pit or sometimes an open pit, and it also included samples that were located to try to find the edges of those impacts.
Q. And I understood from Mr. Connor's evidence that these samples where he called them perimeter samples, perimeter samples or delineation samples; correct?
A. The samples collected by Chevron included both

source samples and perimeter samples.
Q. And I understand that for the purposes of the 2008 Report, no specific health-risk samples were taken; correct?
A. No, I would not agree with that.
Q. When you identified contamination in some sites, did Chevron take specific samples to confirm health risk?
A. Yes, I think every sample that was collected during the Judicial Inspection process was collected and analyzed in a way to allow the evaluation or the presence or absence of a health risk.
Q. When samples indicated contamination, did Chevron take additional samples to verify if there were threats to health, to human health, in the sites? Yes or no.
A. I'm not following your question. During the Judicial Inspection process, specific areas of concern were identified. Those included pit features and spill areas and other locations with evidence of contamination, and those were sampled as part of the Judicial Inspection process by Chevron, and the analytical results from those samples provided the information needed to evaluate the presence or absence of health risks.
Q. What you're saying is that, on the basis of the samples taken by Chevron for delineation purposes, testing for human health risk was undertaken; correct?

A. I'm saying that all of the samples that were collected by Chevron, that includes the source samples--that could be a pit or a spill--it included delineation samples, and it also included additional samples such as samples from hand-dug wells or from any water resource that was identified by the residents as being used as a water resource.
So, all of those samples were analyzed for the health constituents and included in the risk assessment.
Q. Are you aware, are you not, sir, that the methodology of RBCA in the ASTM 1995 Standard Guide comprises a multi-tiered methodology?
A. Yes.
Q. And are you aware, are you not, sir, that this multitiered methodology for RBCA implies that from one tier to another additional information should be obtained?
A. As you move from one tier to another, it may be required--it may be necessary to obtain additional information.
Q. And you didn't follow, did you, sir, the multi-tiered process provided for in the ASTM 1995 Standard Guide?
A. Yes, I did.
Q. Did you take samples from one tier to another during your RBCA analysis?

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A. Yes, so, I evaluated every individual sample comparing that against the health-based screening values that we've discussed, and then the samples that had constituents above a health based screening value, I obtained additional information to evaluate the specific exposure circumstances associated with those samples. So, I obtained the additional information I needed to complete that evaluation.

Q. When you undertook the first step of your analysis, you did it on the basis of the samples taken by Chevron; correct? In 2008.

A. Correct.

Q. And then when you came to the conclusion that there was some toxicity in the samples and there were some potential exposure pathways, you didn't take additional samples, did you?

A. I think you're misunderstanding the process. The process does not require additional site sampling after the initial evaluation. In fact, it's most common to complete the site investigation and to do the evaluation, the tiered evaluation after the site investigation is completed.

Q. If we come back to Tab 9, Dr. McHugh, and we go to Page 4, towards the bottom of the page you find Article 5: Tiered approach to Risk Based Corrective Action, RBCA, at petroleum release sites.

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Do you see that, sir?

A. Yes.

Q. And Article 5(1) says: "RBCA is the integration of site assessment, remedial action selection, and monitoring with USEPA recommended risk and exposure assessment practices. This creates a process by which corrective action decisions are made in a consistent manner that is protective of human health and the environment."

And I am interested in Section or Article 5.2, which says: "The RBCA process is implemented in a tiered approach involving increasingly sophisticated levels of data collection and analysis. The assumptions of earlier tiers are replaced with site-specific data and information. Upon evaluation of each tier, the user reviews the results and recommendations and decides whether a more specific analysis is warranted."

So, I put to you, Dr. McHugh, that the RBCA process in this guide requires sophisticated levels of data collection in the different tiers of the process.

Do you agree?

A. This doesn't say anything about additional data collection from the site. It's simply explaining that the Tier 1 evaluation can be completed considering less of the available information because it's a simpler evaluation process. As you move to the higher evaluations, you will

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incorporate more of the available information in order to refine that analysis. The process by which you obtain that information is not specified. There certainly could be situations where a person returns to the site to collect more information, but that's certainly not a required element. And it's absolutely not necessary for many of the tiered evaluations.

Q. The last step of the analysis--

PRESIDENT VEEDER: Are you moving away from that paragraph? Are you moving away from that page, that paragraph?

MR. SILVA ROMERO: I am.

PRESIDENT VEEDER: Could I just draw your attention to Paragraph 5.3, "Site Assessment," and it begins: "The user is required to identify the sources of the chemicals of concern," et cetera. But could you look at the last sentence in Paragraph 5.3: "The site assessment will also include information collected from the historical records and a visual inspection of the site."

THE WITNESS: Yes.

PRESIDENT VEEDER: To what extent is that an essential part of your work?

THE WITNESS: Well, historical records and visual inspection is commonly used in the site assessment phase to guide the locations where you collect individual samples

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for analysis, so.

Again, I wasn't in the Concession Area for the site investigation step, but from working closely with the people who were, there was a lot of preparation for the site investigation step, and that involved reviewing historical records and aerial photographs to identify the locations of the individual pits, which I think Mr. Connor explained, sometimes were difficult to observe visually in the field because of the changes in vegetation. So they incorporated the historical records as one method to evaluate specific features to be sampled, and then they also utilized visual observations. If there was visual evidence of a spill or an impact, that was also typically included in the Judicial Inspection process for sampling.

PRESIDENT VEEDER: Thank you.

BY MR. SILVA ROMERO:

Q. The last step in your analysis, Dr. McHugh, is what you call "risk characterization;" correct?

A. Yes.

Q. And in your 2008 Report, you concluded that 15 samples required risk characterization; correct?

A. Is there a page you're looking at for that?

Q. Oh, yes, Page 76 of the 2008 Report.

And I understand that for risk characterization, you analyzed five soil samples; correct?

A. Yes.
Q. Two sediment samples; correct?
A. Yes.
Q. And eight surface water samples; correct?
A. Yes.
Q. So, let's examine a couple of these examples to finish our conversation today, Dr. McHugh, if you will. First, I would like to discuss about, on Page 77, one of the soil samples, which is SSF38 well site.
Do you see that?
A. Yes.
Q. And you say here: "The soil sample exhibited benzo(a)pyrene at a concentration of 1.2 both the health-based screening criteria which is safe for daily direct contact in a residential setting. However, the sample was collected from the middle of a cornfield 60 meters south of the SSF38 platform at a location not likely to be accessed by the residents on a daily basis." My first question, Dr. McHugh, is on what basis you came to the conclusion that this location is not likely to be accessed by residents on a daily basis.
A. That was based on reviewing the Judicial Inspection Report for the site, and the included sample location maps and other information documenting the location of the sample and the location of residences. And

as discussed here, the sample was from a cornfield, so it's property being used for agricultural purposes, and not in the immediate proximity of a residence, so that's the basis for my evaluation.
Q. So, if I understood your response correctly, you based your analysis on current exposure; correct?
A. This analysis was based on current, yeah, use, yes.
Q. And you didn't analyze for this sample, future exposure, did you?
A. This location would be safe for the current or future agricultural use. As is documented, it's above the screening value for a residential setting.
Q. But you didn't say here or you didn't include here any analysis of future exposure; correct?
A. Yes.
Well, the text says that it is above the screening level for residential use, and so it is above a value for future residential--
Q. But this is a land use. I'm asking you a question about exposure, Dr. McHugh. You didn't analyze future exposure here, did you?
A. Well, I mean, the evaluation covers, yes, current and future exposure.
Q. Then if we go to another example, which is also

sample SSF38, but this time I want to discuss about the sediment sample, which is described on Page 78 of the Report.
Are you with me, Dr. McHugh?
A. Yes.
Q. Here, you say the following: "Sediment sample exhibited benzo(a)pyrene at a concentration of 1.3 above the health-based screening criteria which is safe for daily direct contact in a residential setting. However, the sample was collected from an open pit at a non-RAP site operated by Petroecuador."
Here, my first question is: Did you receive a legal instruction not to consider open pits at a non-RAP site, did you not, sir?
A. No, I considered all samples at all sites.
Q. Why do you refer here to a non-RAP site?
A. Well, this is my evaluation of the sample at this non-RAP site.
Q. Is it relevant for a risk-characterization analysis to include an observation as to the fact that the open pit was not or was at a non-RAP site?
A. The location of the sample being at a RAP site or a non-RAP site, does not affect the risk evaluation, but it does provide context for the location of the sample.
Q. The problem, Dr. McHugh, is that here you say

"however." You are first of all describing a sample which may have some threats to human health, and then you say "however, this sample was collected from an open pit at a non-RAP site."
Do you see that?
A. Yes.
The important information there is it's an open pit. An open pit is not an environment suitable for a residential setting.
Q. And here you didn't analyze either future exposure, did you, sir?
A. Well, in this case, being an open pit, it would not be suitable for residential use as long as it's open. And if it were properly closed, then that would change the conditions at that location.
Q. So, you simply don't know what would happen in the future with that pit, do you?
A. I do not.
Q. Dr. McHugh, you showed during your direct presentation, a Slide 21, if we can come back for the last line of questions to Slide 21, and you showed a picture of a spring being tested at Guanta 6. Do you recall that?
A. Yes.
Q. Do you know where that spring is located, sir?
A. Yes, I have a general understanding of where it's

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located.
Q. Do you know how close this spring is to the well Guanta 6?
A. I don't know the exact distance. I know that there is a stream between the wellhead and the spring, so this spring is located on the other side of the stream, and it may be up a hillside a little ways.
Q. Did you evaluate any of the samples you analyzed to determine whether--to determine where they were located relative to a pit?
A. For this specific sample?
Q. Yes.
A. I don't know the distance to the nearest pit.
Q. Did you evaluate any of the samples you analyzed to determine where they were located relative to known contamination?
A. I don't--no.
Q. Did you evaluate any of the samples you analyzed to determine where they were located relative to expected contamination?
A. No, I evaluated the analytical results for the samples.
Q. You also showed a picture--and I believe it's Slide 59, Dr. McHugh.
A. Yes.

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Q. And this is a picture of the monitoring well of Aguarico 6; correct?
A. Yes.
Q. And you said that there was no well present there before LBG installed their monitoring well; correct?
A. That's correct.
Q. So, you are evaluating that site based solidly on current use of the site; correct?
A. Well, yes, I'm evaluating my exposure based on the fact that there is not an actual well and nobody is drinking that water.
Q. And generally, what year do you use, Dr. McHugh, to identify current uses in the Concession Area?
A. I evaluated the available information, so for the Judicial Inspection sites, it would have been the time of the Judicial Inspection.
Q. So, it would be as of 2004?
A. The Judicial Inspection process, I believe, is 2004 through 2007.
Q. But will you agree with me and Mr. Connor that a proper risk assessment, Dr. McHugh, evaluates current and future use?
A. Yes, and I evaluated current and future use. So the comparison against screening values was for any residential use, and then for those samples that exceed

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screening values, I looked at the location of that sample and evaluated the current use of those locations.
Q. Thank you, Dr. McHugh.
MR. SILVA ROMERO: I don't have any further questions, Mr. President.
PRESIDENT VEEDER: Thank you very much.
Any re-direct from the Claimants?
MS. RENFROE: Briefly.
PRESIDENT VEEDER: Please.
MS. RENFROE: Thank you, Mr. President, and Members of the Tribunal.

REDIRECT EXAMINATION

BY MS. RENFROE:
Q. Dr. McHugh, I will try to do this quickly but I think it's important to do it properly.
So, you have been asked by counsel about the four components of the risk-assessment process that you followed?
A. That's correct.
Q. And you were also asked about differences between your approach and the approach of the--the approach of Dr. Strauss?
A. Yes.
Q. So, I would like to return to some of those points, and I would like to start with the ASTM Standard

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that counsel asked you about, and I believe it's Tab 9 in the binders, and I would ask my colleague behind me if he can open to McHugh 43, please, and I would direct--but, first, let's just be clear on what we're looking at.
This is the ASTM Standard that you described that you relied upon.
A. That's correct.
Q. And upon which Mr. Silva Romero has put a number of questions to you?
A. Yes.
Q. And so, I would like to direct your attention to Page 8, Paragraph 6.4.3.
A. Yes.
Q. That paragraph is entitled "Use of Total Petroleum Hydrocarbons measurements."
Do you see that?
A. Yes.
Q. Now, in terms of understanding one of the differences between your approach to the human health-risk assessment and the approach of Dr. Strauss, can you review this paragraph and tell us or explain to us the difference between your approach and her approach.
A. Yes. So, this paragraph says that: "Chemical analysis methods, commonly referred to as Total Petroleum Hydrocarbons (TPH), are often used in site assessments."

It explains that the methods usually determine the total amount of hydrocarbons present in a single number and give no information about the types of hydrocarbons present." It says: "TPHs should not be used for risk assessment because the general measure of TPH provides insufficient information about the amounts of individual chemicals of concern present."

And my risk assessment focused on those individual chemicals of concern.

Q. And that was the 30 chemicals that you described during your direct presentation?

A. That's correct.

Q. So, compare this approach to the approach used by Dr. Strauss, please.

A. Well, as I explained in my presentation, Dr. Strauss used six different evaluation methods, and some of those methods relied on TPH analytical methods that are simply inappropriate for risk assessment, the methods that present a single number.

She also used, as I tried to describe, a method that provides some information regarding the composition of the petroleum material, and there is a regulatory guidance she relied on, her Method Number 1, that does establish an evaluation process based on that information about the composition of the petroleum, but it's a less precise

method than the individual chemicals of concern approach.

Q. And if we could go to the slide in your presentation that includes the pyramid--and I'm trying to find it--I believe it's your Slide 20. If we could have that put back up.

MR. SILVA ROMERO: Mr. President, I hate to object, but I didn't put any questions to the Witness on this very slide, and I didn't ask any questions on the different methods that my friend Mr. García Represa discussed with Mr. Douglas.

MS. RENFROE: Well, may I respond, Mr. President?

PRESIDENT VEEDER: Of course.

MS. RENFROE: You certainly did ask questions of this Witness about differences in the approach to risk assessment between Dr. McHugh and Dr. Strauss, and you did put questions to this Witness about the ASTM Standard, and the paragraph that Dr. McHugh just explained is illustrated by this slide. So, I think it would be helpful to the Tribunal, and fair to the Witness, to give him an opportunity to explain his answer, as it relates to the ASTM Standard that he used.

PRESIDENT VEEDER: You can respond.

MR. SILVA ROMERO: Mr. President, but I believe what is happening here is that you will hear again the direct presentation by Dr. McHugh and, frankly, I didn't

put any questions on this very issue, and I don't find helpful for the Tribunal to hear again the same explanation you already got at the beginning of Mr. McHugh's examination.

(Tribunal conferring.)

PRESIDENT VEEDER: I think we need to hear your specific question because it's true that this particular Slide 20 was not something on which this Witness was cross-examined, but let's just see where the question goes. What is your question precisely?

MS. RENFROE: Right. So--and we don't have to use the slide. It's simply for--

PRESIDENT VEEDER: Don't use the slide, then.

MS. RENFROE: Fine. Fine.

PRESIDENT VEEDER: Put it aside. Just give us the question, but don't answer until we've ruled.

MS. RENFROE: So, in relation to the question I had previously asked about whether the use of Total Petroleum Hydrocarbons measurements is appropriate or not for quantitative risk assessment, I was asking Dr. McHugh to compare his approach to the approach used by Dr. Strauss.

(Tribunal conferring.)

PRESIDENT VEEDER: You come in just under the wire. You can put that question.

MS. RENFROE: Thank you.

BY MS. RENFROE:

Q. So, Dr. McHugh, as it relates to the provision in the ASTM Standard that you followed, Section 6.4.3, use of Total Petroleum Hydrocarbon measurements, and the guidance provided here, can you please compare your approach to that approach used by Dr. Strauss?

A. If I recall correctly, Dr. Strauss used as many as four different TPH methods in her risk assessment, using these different analytical methods for the same individual locations, and so those TPH methods ranged from methods that are simply never used for petroleum risk assessment to methods that provide some information concerning the potential risks associated with petroleum but are less precise than the individual chemical approach that I used and is recommended in this ASTM Standard.

Q. Now, I would like to move to a different component of your risk assessment that you were asked about by my colleague, and that is the toxicity value. I believe you were asked some questions about that. And so, can you--

MR. SILVA ROMERO: I'm sorry, I don't recall any questions on toxicity value, I myself. I prefer to make the comment now than later, when a slide and a question is already put to the Witness.

MS. RENFROE: You asked him questions. In fact,

you asked about one of the principal differences between his approach and Dr. Strauss's approach, and it had to do with the toxicity value. That's exactly what you were asking about. You may not have appreciated that, but that's how I heard it.

So, with all due respect I would like to ask my Witness and for him to have an opportunity to respond.

PRESIDENT VEEDER: Please pose the question, and don't answer until we've ruled.

What is the question?

BY MS. RENFROE:

Q. The question is: Comparing your approach to that of Dr. Strauss, with respect to the toxicity value, can you please compare your approach to that of hers.

PRESIDENT VEEDER: Stop there. We will take it one by one.

(Laughter.)

(Tribunal conferring.)

PRESIDENT VEEDER: I think it would be helpful if we could find in the cross-examination the passage where you say this particular matter was raised, even if the particular word wasn't used. Can you do a search on the Transcript? Have you got it in mind?

MS. RENFROE: Yes, if you can give me just a moment.

PRESIDENT VEEDER: We will give you all the moments you need.

MS. RENFROE: Thank you.

(Pause.)

MS. RENFROE: Okay. I found it. Page 127, Line 18. And I'm sorry I'm not very facile with operating this software. But the question was asked--although I can't put it in context because I can't read the question above it--but the question was:

"And the selection of chemicals of concern is based on the consideration of exposure routes, concentration, mobilities, toxicological properties, and characteristics such as taste, odor, and so forth; correct?"

So, that's the question I want to follow up on. "Toxicological properties" goes right to toxicity value.

MR. SILVA ROMERO: If I recall well the context--but apparently my friend Ms. Renfroe remembers my questions better than I--I could--I put that question just to test the esthetics that Dr. McHugh did not appreciate in his analysis, as you may recall. And at the end of that provision, there is a reference to the esthetics such as taste, odor, and so forth, as we went through together, I hope, during the examination.

So, I maintain the objection.

PRESIDENT VEEDER: Well, Ms. Renfroe, again, in regard to that passage you say you want to raise a question based upon that passage. Does that change the question you gave us earlier? Does it refine it?

MS. RENFROE: Well, I--actually, to refine, I found another question that is getting even more precisely to the point, and this question is at Page 131, beginning at Line 25, and continues on to Page 132.

The question:

"And as a layman, I understand the second step as the application of some relevant standards to the identified contamination to find out how toxic that contamination can be. Do you agree with me?

"ANSWER: That's correct," and then there is a word I can't read. And then,

"QUESTION: And hence, the choice of the relevant criteria, what you call the health-based screening criteria, is appropriate?

"ANSWER: It's important to select the appropriate values, yes.

"QUESTION: And I understand the main difference between you and Dr. Strauss is precisely the choice of those criteria; correct?

"ANSWER: No, there are many differences that

we have."

And that's exactly the question I want to go to now, is those choice of toxicity values.

(Tribunal conferring.)

PRESIDENT VEEDER: Please proceed.

MS. RENFROE: Thank you very much.

BY MS. RENFROE:

Q. So, now, Dr. McHugh, back to my question. Can you please compare--explain to the Tribunal what you mean or what the term "toxicity values" means within the context of a human health-risk assessment such as you have performed, and then please compare your approach to toxicity values with the approach of Dr. Strauss.

A. Yes. In applying risk assessment to a contaminated site, in our industry, we always rely on toxicity values that are developed by regulatory authorities. And using my risk-based screening values that were developed by the World Health Organization and the USEPA, that's exactly what I did.

Dr. Strauss, for her evaluation method one, relied on the toxicity values developed by the State of Massachusetts for the procedure that they established. For her evaluation methods three through six, she utilized a toxicity value that she developed on her own, and that's not how we evaluate risks at sites.

Q. And do taste and odor criteria have anything to do with setting toxicity values for human health risk?
A. No, they do not.
Q. All right. My last question is this: Is it common in your field of risk assessment science to do quantitative risk assessments without actually personally doing a site visit?
MR. SILVA ROMERO: Objection. Leading.
PRESIDENT VEEDER: I think you're being unkind. It's a long day.
(Laughter.)
MR. SILVA ROMERO: I withdraw my objection out of kindness, Mr. President.
PRESIDENT VEEDER: You know very well that question could be rephrased.
MS. RENFROE: I'm happy to rephrase it.
PRESIDENT VEEDER: Slightly rephrase it.
BY MS. RENFROE:
Q. What is--can you comment on the requirement or the necessity of personally doing a site visit in order to do a quantitative human-health risk assessment?
A. Yeah. Risk assessment is one part of the site evaluation process. And so, the evaluation process is always implemented by a team of personnel, and it's very common that the risk assessor does not personally visit the

site, and in this case I did not visit the site. And it's also illustrated by the evaluations completed by Dr. Strauss. Dr. Strauss submitted her first risk assessment to the Tribunal without visiting the site.
MS. RENFROE: Thank you.
I have no further questions.
QUESTIONS FROM THE TRIBUNAL
PRESIDENT VEEDER: Well, with some trepidation, I have one question for you.
THE WITNESS: Okay.
PRESIDENT VEEDER: It relates to the PowerPoint Slide 40 that you showed us earlier today. And as you recall, you described how this came from Dr. Strauss's Report, I think her Second Expert Report, and you showed us the Figure 20 in Column 6 against the fifth pit, Shushufindi 13.
Do you see that?
THE WITNESS: Yes.
PRESIDENT VEEDER: And if you read across, it relates to "current exposure playing in the stream."
Do you see that?
THE WITNESS: Yes.
PRESIDENT VEEDER: Now, the Figure 20 on which you made some comments has two asterisks. And if we look at Dr. Strauss's Report, that indicates that she assessed the

risk from the sediment only, the water was not evaluated.
Now, I just wanted to ask you whether that made a difference to your comment or not?
THE WITNESS: No. Let me try to provide a little context for the Tribunal.
So, the samples collected from this location, there was a surface-water sample collected and a sediment sample collected. And if I understand Dr. Strauss's Report correctly, the surface sample was analyzed using three different methods to measure petroleum in a sample, and that's the VPH/EPH method, the 8015 method, and the Texas 1005 method.
The sediment sample was analyzed using four different methods: The VPH/EPH method, the 8015 method, the Texas 1005 method, and then this TEM method that has been the subject of some discussion.
So, I think Dr. Strauss is simply trying to acknowledge that for her method number six, which utilizes that TEM method, she could only conduct her risk assessment based on the sediment result. But if you look right adjacent to that, this Texas 1005 method, she has an ND, which means not detected. In this case it means no petroleum was detected in either the sediment sample or the surface-water sample. And if I recall correctly, I believe also the surface-water sample was non-detect by this

VPH/EPH method, although it's not shown on this table, but that's my recollection, is that there was no petroleum detected in the surface-water sample by that method.
And so, I think that, based on those analytical results where petroleum was not detected in surface water by those other methods, the absence of a surface-water sample analyzed by this fourth method probably does not affect the risk evaluation very much at that location.
PRESIDENT VEEDER: Thank you.
As a matter of fairness, if the Respondent have any questions arising from this Tribunal, they can pose them.
MR. SILVA ROMERO: No, Mr. President. Thank you.
PRESIDENT VEEDER: And the Claimants?
MS. RENFROE: No further questions. Thank you.
PRESIDENT VEEDER: Well, thank you very much for coming to assist the Tribunal. We have come to the end of your testimony.
THE WITNESS: Thank you for your time.
(Witness steps down.)
PRESIDENT VEEDER: Now, I think we really do need to address the schedule up to Tuesday evening. I see you're both ready to deal with that. You too? We'll give the floor to the Claimants first.
MR. BISHOP: Yes, Mr. President.

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My understanding from--is that there was not a specific agreement on a chess clock, but I do think we had an expectation that there would probably be a certain rough equivalency about the hours used. So, we were, I think, quite surprised to see the disparity in time that you mentioned. It's not our position that we're going to insist on complete equivalency in hours. We're not inflexible about that. But what is important to us is that we stay on time and that we not be restricted in our use of our time to cross-examine witnesses as we need to do.

Having said that, I think that we're roughly on schedule. And so, if I understand the schedule, we were supposed to start Mr. Hinchee in the morning? I think that's right.

MR. BLOOM: We had hoped to begin Dr. Hinchee this afternoon at some point. He was to continue tomorrow.

PRESIDENT VEEDER: Yeah.

MR. BLOOM: By my calculation, and I've kind of been calculating every day, I kind of see us as probably about an hour behind.

If you look at the schedule, by the way, on Tuesday, when Mr. Coriell and I had gone--if you look the at schedule, on next Tuesday, we had anticipated being done by lunchtime, so we knew we had a few-hour buffer as well, and I appreciate Mr. Bishop's remarks.

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Just to go ahead and give you a little bit of background on some of the discussions, and Mr. Coriell is not here.

PRESIDENT VEEDER: We also did not think there was a formal Böckstiegel split to be rigidly enforced, and we appreciated what you were doing, and it seemed to be a workable program. And our concern is really that we really would like, I think, to finish Tuesday evening or Tuesday afternoon, because you need a day to prepare for what are very important closing oral submissions.

So, I think our purpose is really just to ensure that, without fail, we will finish by Tuesday night without anybody feeling squeezed and going short. So, I think, don't worry about the past. We just want to look at the future. We've got witnesses coming and we would just like to have some comfort as regards some rough estimate as to how you each think those witnesses will be treated.

MR. BLOOM: I'm happy to share, and share both of our estimates, because had shared with one another prior to the Hearing. We are anticipating that the cross for Mr. Hinchee will be about 2.5 hours. I would hope that we would have him on and off by at least a late lunch tomorrow; that we would begin Dr. Strauss tomorrow afternoon.

I know that Claimants had advised that they were

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anticipating, without being bound to anything, seven hours of cross combined for Dr. Strauss and LBG. That may expand. You know, no one is holding them to anything, but I think if we don't finish Dr. Strauss tomorrow, she will wind up continuing for a bit Monday morning. LBG will be on Monday. And then the estimate we received for Dr. Andrade, the last witness, was two hours--again not holding Claimants to anything, but, again, we've got several hours to play, if you will, in the event it runs long, because we--it's not our intent, of course, to squeeze them either.

The other thing I'll just mention--and there are a lot of accommodations, as you would hope and expect, prior to the start here. One of our accommodations, of course, was we began a day late to accommodate Mr. Pate, but part of the Agreement was, if we needed to, we could go out on a Saturday. If we needed to, we would proceed next Wednesday.

Things have been on schedule. I don't think either side anticipates a need, certainly not at this point.

MR. BISHOP: I think the Claimants would generally be in agreement with that. I think that we are pretty much on schedule. We definitely don't want to go into next Wednesday, if we can help it, so that we do have that lay

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day to prepare for closings. We think that's important. But I think we're roughly on schedule, and we're okay at this point.

PRESIDENT VEEDER: That's very comforting news. We had felt that maybe things weren't as comfortable, and we were going to have to adjust the sitting hours to ensure that we did finish by Tuesday. But let's look at the immediate opportunities. We could have Mr. Hinchee in chief now, and then the cross-examination could start tomorrow morning. Is that a possibility? It should be.

MR. BISHOP: Well, I suppose it's a possibility. I think our preference would to be put him on first thing in the morning. If the Tribunal would like to start a little bit earlier, I think that would be fine, and that may be a way of accomplishing the goal. We would like to, of course, to get done with both Mr. Hinchee and with Ms. Strauss tomorrow if possible. And we'll strive to do that. I can't ensure it but, obviously, we'd like to do that.

PRESIDENT VEEDER: I think we can start at 9:00 tomorrow to give us a longer day. We had a shorter day today. Is 9:00 acceptable?

MR. BLOOM: Sure, it is.

PRESIDENT VEEDER: Let's start at 9:00 tomorrow, and let's keep this under continual review, and if either of you think we are slipping behind, please tell us, and we

will have to adjust sitting hours accordingly. But as we understand it, you are both confident we will finish by Tuesday evening?

MR. BISHOP: Yes.

MR. BLOOM: There is one issue that I don't think the Parties are prepared to bring to the Tribunal's attention just yet because I think it's very premature, and the Parties are talking about some other issue, unrelated to the issues that we're talking about right now.

PRESIDENT VEEDER: Well, there is a certain amount of housekeeping we've got to address, and we will fit that in when we can and when we should.

But let's stop now, and we will start at 9:00 tomorrow. Thank you.

MR. BISHOP: I'm sorry, just one quick question for the Tribunal, which is we had addressed the possibility of the Tribunal giving us some guidance for closing arguments, and we would very much solicit that guidance at the earliest possible moment from the Tribunal.

PRESIDENT VEEDER: Yeah, no, we heard your message. It's our intention to try and get you something tomorrow night. Whether it's guidance, it's up to you, but you will get something.

MR. BISHOP: Thank you.

(Whereupon, at 4:57 p.m., the Hearing was

adjourned until 9:00 a.m. the following day.)

CERTIFICATE OF REPORTER

I, David A. Kasdan, RDR-CRR, Court Reporter, do hereby certify that the foregoing proceedings were stenographically recorded by me and thereafter reduced to typewritten form by computer-assisted transcription under my direction and supervision; and that the foregoing transcript is a true and accurate record of the proceedings.

I further certify that I am neither counsel for, related to, nor employed by any of the parties to this action in this proceeding, nor financially or otherwise interested in the outcome of this litigation.

DAVID A. KASDAN