UNITED STATES DISTRICT COURT

EASTERN DISTRICT OF LOUISIANA

IN RE: OIL SPILL BY THE OIL RIG *DEEPWATER HORIZON* IN THE GULF OF MEXICO ON APRIL 20, 2010	*	Civil Action No. 10-MD-2179
	*	Section J
	*	New Orleans, Louisiana
THIS DOCUMENT RELATES TO: #10-4536	*	January 21, 2015
UNITED STATES OF AMERICA	*	
v.	*	
BP EXPLORATION & PRODUCTION INC., ANADARKO EXPLORATION & PRODUCTION LP, ANADARKO PETROLEUM CORPORATION, MOEX OFFSHORE 2007 LLC, TRITON ASSET LEASING GMBH, TRANSOCEAN HOLDINGS LLC, TRANSOCEAN OFFSHORE DEEPWATER DRILLING INC., TRANSOCEAN DEEPWATER INC., AND QBE UNDERWRITING LTD., LLOYD'S SYNDICATE 1036	*	

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DAY 2, AFTERNOON SESSION
TRANSCRIPT OF TRIAL PROCEEDINGS
HEARD BEFORE THE HONORABLE CARL J. BARBIER
UNITED STATES DISTRICT JUDGE

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AFTERNOON SESSION

(January 21, 2015)

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(OPEN COURT)

12:40

01:04 **THE COURT:** All right. Please be seated, everyone.

01:04 All right. The government may call its next

01:04 witness.

01:04 **MS. FIDLER:** Good afternoon, Your Honor.

01:04 Diane Fidler for the United States. I'll be doing the direct

01:04 examination of Stanley Rice.

01:04 **THE COURT:** Okay.

01:04 **MS. FIDLER:** The United States calls

01:04 Dr. Stanley Rice.

01:04 **THE COURT:** All right. Very well.

01:04 And I know there's another *Daubert* -- excuse me

01:04 one second, Stephanie.

01:04 **THE DEPUTY CLERK:** Sure.

01:04 **THE COURT:** I know there's another *Daubert* motion and

01:04 that we're going to proceed along the same lines that we have

01:04 with the last couple of witnesses. Okay?

01:04 **MS. KARIS:** Very well. Thank you, Your Honor.

01:04 **THE COURT:** All right. Go ahead.

01:04 (WHEREUPON, **DR. STANLEY RICE**, having been duly sworn,

01:04 testified as follows:)

01:04 **THE DEPUTY CLERK:** Please take a seat and state and spell your name for the record.

01:04 **THE WITNESS:** My name is Stanley Rice, S-T-A-N-L-E-Y, R-I-C-E.

01:05 **DIRECT EXAMINATION**

01:05 **BY MS. FIDLER:**

01:05 **Q.** Dr. Rice, you've been retained on behalf of the United States to serve as an expert in this case; correct?

01:05 **A.** Yes.

01:05 **Q.** What tasks were you asked to perform?

01:05 **A.** I was given two tasks. I was asked to look at the potential for toxic harm coming from the *Deepwater Horizon* spill and also to review Dr. Shea's reports.

01:05 **Q.** Dr. Rice, what do you consider to be your areas of expertise as it relates to the work you did in this case?

01:05 **A.** My area of expertise is toxicology, specifically with oil, physiology.

01:05 **Q.** All right. Dr. Rice, briefly, what is toxicology?

01:05 **A.** Toxicology is the investigation of chemicals and how they affect organisms, and the effect can be at the cellular level or tissue level of the whole organism.

01:06 **Q.** Dr. Rice, have you prepared a slide summarizing your education and experience as it relates to this case?

01:06 **A.** Yes, I have.

01:06 **Q.** Mr. Jackson, please call D-32600.

01:06 Dr. Rice, could you please describe your educational background for the Court?

A. Yes. I have a Bachelor's and a Master's degree in biological science from Chico State University. I have a Ph.D. in physiology from Kent State University where I did my dissertation on ammonia toxicity to embryo -- fish embryos.

Q. And turning to your professional experience, are you currently retired, Dr. Rice?

A. Yes, I am, as of 2012, the end of.

Q. Where were you employed prior to your retirement?

A. I was employed at the Auke Bay laboratory, which is a NOAA laboratory, in Juneau, Alaska.

Q. How long did you work at NOAA?

A. I worked there for a little over 41 years.

Q. Could you please describe your work at NOAA as it relates to your expertise in this case?

A. I was hired specifically to initiate an oil effects program in Juneau, Alaska. This was just prior to the oil pipeline and large-scale transport of oil in Alaska. I was -- part of my job was to recruit and hire both biologists and chemists and create this team that would do a lot of bioassay research.

Later on, we were deployed to the Ixtoc spill that most importantly -- I'm sorry. I was deployed to the Ixtoc spill, which was in 1979 down here in the Texas coast,

01:07 Corpus Christi. Later on, I was deployed, along with my team, to the Exxon Valdez spill in Prince William Sound, Alaska, where we actually worked on that spill for the next 25 years. I've also been deployed to the Selendang Ayu spill and the Kuroshima spill, two different spills in the Aleutians.

Over the years, we did a lot of, of course, long-term effects in embryo toxicity work more related to the Exxon Valdez spill.

Q. Dr. Rice, have you written any peer-reviewed publications in your areas of expertise?

A. Yes, I have. Coming out of all that work I just described, I've published over 130 peer-reviewed publications, along with a lot of coauthors.

Q. Have you received any awards in your 40-year career in the field of toxicology?

A. Yes. I've received a bronze award along with a colleague of mine, and also later a Distinguished Career award from NOAA. And all of this is work related to the embryo toxicity work I was pioneering, and also the long-term effects of research that we were doing relative to Exxon Valdez.

Q. Please call TREX-13330.

Dr. Rice, do you recognize this document?

A. Yes. This would be my Round 1 report that I authored.

Q. And does this report contain a copy of your current CV?

A. Yes, it does.

01:08 **Q.** And does that CV accurately summarize your qualifications in this case?
01:08 **A.** Yes.
01:08 **Q.** Please call TREX-13331.
01:09 What is this document?
01:09 **A.** This would be the Round 2 report that I coauthored with Dr. Don Boesch.
01:09 **Q.** And please call TREX-13332.
01:09 What is this document?
01:09 **A.** This would be the Round 3 report.
01:09 **Q.** Dr. Rice, did you discover any errors in your Round 3 report after you filed it?
01:09 **A.** I did. During the depositions, some errors were pointed out and I corrected these. These are all in Appendixes B and C.
01:09 **Q.** And I'd like to call TREX-13332-E.
01:09 Is this the corrected version of those appendices?
01:09 **A.** It is.
01:09 **Q.** And I'd like to briefly clarify those errors for the Court. Please turn to TREX-13332-E.006, which is page 2 of the revised Appendix B contained in the errata. And could you please briefly describe the error in Appendix B and your correction?
01:10 **A.** This is described in this rather lengthy paragraph.
01:10 Basically, in the 18,000 sample database, which has

01:10 two and a half million records in it, we had scrambled, in some
01:10 cases, the depth and location records. We had mismatched them.
01:10 This was corrected in this version.
01:10 **Q.** Turning to the errors in Appendix C, please turn to
01:10 TREX-13332-E.018. And, I'm sorry, could you turn to the next
01:10 page, .019.
01:10 What was the error in the original version of this
01:10 appendix?
01:10 **A.** This bibliography here of effects and papers and
01:10 concentrations. There's one paper, the Incardona paper, we had
01:11 misidentified two species in that report and they have been
01:11 corrected.
01:11 **Q.** Do these errors, as we've discussed, change the opinions
01:11 set forth in your reports regarding whether there was a
01:11 potential for toxicological harm as a result of the
01:11 *Deepwater Horizon* spill?
01:11 **A.** No, not at all.
01:11 **Q.** Do TREX-13330, TREX-13331 and TREX-13332, along with the
01:11 revisions in TREX-13332-E, accurately state your opinions and
01:11 the bases therefor that you are offering to the Court in this
01:11 matter?
01:11 **A.** Yes, they do.
01:11 **MS. FIDLER:** Your Honor, at this time I tender
01:11 Dr. Stanley Rice as an expert in ecological toxicology and the
01:11 toxicological effects of oil on marine life.

01:11 **THE COURT:** All right. Other than the motion you filed, any other questions?

01:11 **MS. KARIS:** None, Your Honor.

01:11 **THE COURT:** Okay. Very well. He's accepted in that field. And let's proceed. Okay?

01:11 **BY MS. FIDLER:**

01:11 **Q.** Dr. Rice, finally, do you adopt these reports as identified, as your testimony today?

01:11 **A.** Yes, I do.

01:11 **Q.** Have you prepared a slide summarizing your key findings in this case?

01:12 **A.** Yes, I have.

01:12 **Q.** Mr. Jackson, please call D-32604.

01:12 Dr. Rice, is this that summary?

01:12 **A.** It is. There's --

01:12 **Q.** And, Dr. Rice, what are your key findings in assessing the potential of toxicological harm from the *Deepwater Horizon* spill?

01:12 **A.** Well, specifically about the *Deepwater Horizon* spill, there are two parts, basically, the exposure part and the harm part.

01:12 In both cases, I find that there is reason to believe that there was certainly toxicological exposure. That's from the unprecedented exposure to dispersed oil both at depth and also at the surface, the three months of exposure before the

well was capped. And the PAHs most certainly, I think, reached toxic levels in many of the water samples.

In regards to toxicological harm, I think this is demonstrated by the previous two decades or so of research, especially on embryo toxicity, but also more specifically the embryo toxicity work, plus others, demonstrated by the *Deepwater Horizon* research.

Q. And two things, Dr. Rice, could you pull your microphone a little closer to you because I'm actually having trouble --

THE COURT: Yeah. You can move it. There you go.

THE WITNESS: Thank you. I'm sorry.

BY MS. FIDLER:

Q. And if you can slow down a little bit, just a tiny bit.

Doctor, can you discuss your third bullet here?

A. The third bullet, I was asked to look at Dr. Shea's analyses. And I have a conclusion there that I believe he ignores much of that current science, both the past embryo toxicity work, but also the present embryo toxicity work done specifically for this spill.

And I also believe that the way he's done his analyses on the water chemistries, that he hides the harm that is there.

Q. Dr. Rice, we'll discuss your findings in greater detail in a bit. Before we do, have you prepared a slide summarizing the methodology used in forming your opinions?

01:14 **A.** Yes, I have.
01:14 **Q.** Please call up D-32605.
01:14 Dr. Rice, what information did you consider in
01:14 forming your opinions?
01:14 **A.** Well, prior -- I used information prior to the spill.
01:14 This is the several -- a couple decades of research
01:14 specifically done on embryo toxicity, but other work, too. But
01:14 this work basically provided the foundation, if you will, from
01:14 which the *Deepwater Horizon* researchers then moved forward and
01:14 gathered new data.
01:14 Secondly, of course, I used information specifically
01:14 from the spill. I used a lot -- several peer-reviewed papers
01:14 that are coming from the lab or field studies from the spill.
01:14 I used the satellite footprint maps, and I also used the water
01:14 chemistry data. That's that 18,000-sample database.
01:14 **Q.** Dr. Rice, why didn't you rely solely on the NRDA data, the
01:14 water chemistry data?
01:14 **A.** This database is very, very large, 18,000 samples, two and
01:15 a half million records. And it is not peer-reviewed yet. It
01:15 hasn't been synthesized and worked over, so to speak, by the
01:15 people who gathered all of that data.
01:15 **Q.** Dr. Rice, BP's expert, Dr. Shea, has stated that your
01:15 analysis in this case is inconsistent with fundamental
01:15 principles of toxicology. Do you agree?
01:15 **A.** Not at all.

01:15 **Q.** I'd like to elaborate a bit on some of these areas of disagreement. Have you prepared a series of slides explaining key concepts in toxicology relevant to our discussion today?

01:15 **A.** I have.

01:15 **Q.** Let's start with D-32606, please.

01:15 Dr. Rice, could you please explain this first slide?

01:15 **A.** When you're determining mortality or survival or damage, there are really two halves to this equation. Basically, there's the exposure half, meaning the chemicals, the PAHs, all the factors that go into that, such as weathering and dispersion and bioavailability. And then there's the second half, animal sensitivity. Both boxes are very complex and I'll be speaking to the boxes.

01:16 **Q.** And please call the next slide, D-32607-A.

01:16 Dr. Rice, which hydrocarbon compounds are most important to understanding toxicity?

01:16 **A.** That would be the aromatic fraction. In the *Deepwater Horizon* oil and before it begins to weather, there's about 15 percent of that oil is into the aromatics. Another half -- or, actually, three-fourths of the compounds are alkanes. They're not very toxic.

01:16 There are tens -- or tens of thousands of compounds, possibly even more. But it's the aromatic fraction that the last several decades of research have focused on as being the most toxic.

01:16 It's -- there are two major parts of the aromatics. There's the single-ring compounds, like benzene, and then there's the polycyclic aromatics like two-ring, three-ring, four-ring compounds.

01:17 And then in the next slide, I'll talk a little bit more about their solubility and toxicity relevance.

01:17 **Q.** Okay. Do aromatic compounds differ from each other in toxicity?

01:17 **A.** Oh, very much. They differ in size, they differ in chemistry basically, and that means they differ then in toxicity.

01:17 **Q.** And so let's call the next slide, D-32609.

01:17 Dr. Rice, how does the size of aromatics affect their toxicity?

01:17 **A.** The size affects their toxicity a lot, and it's related both to solubility and fat affinity -- related to solubility and also to fat affinity.

01:17 What I've got here in the far left column is the actual diagrams, if you will, of single ring on up through two, three and four-ring benzene rings. Excuse me. The smallest compound there in the lower part there, that's just one ring, that's benzene. All right. And then the next one is the two ring and the three ring.

01:18 As you notice, as you go up in size, you're going up in molecular size, weight, and complexity, you're actually

decreasing the solubility as you go up. That means that the compounds that are most bioavailable -- excuse me, bioavailable in the beginning would be the smallest compounds.

The compounds, once they get into the animal, then they're going to be retained. The compounds that are largest, meaning those four-ring compounds, have the highest fat affinity. And there's fat in the membranes, for example, the cells. So once they get into those, they're going to want to stay. They will not want to leak out, so to speak, back into the water column very easily.

And this relates, then, to the toxicity. The larger the compounds, the more toxic they are. It also means that the more persistent they are.

Q. And just briefly, what is bioavailability?

A. Well, the oil in the oil droplet, unless it's ingested, it's not bioavailable. It has to -- the chemicals have to get out into the water column and then they're bioavailable to the organisms.

Q. So with regards to the heavier PAHs, the ones you've identified as being more toxic that also have lower solubility, how do these heavy PAHs become bioavailable to the aquatic organisms in the Gulf as a result of the *Deepwater Horizon* oil spill?

A. Well, even though they have a lower solubility, they certainly have some. So they do leak out of the -- exit out of

01:19 the oil droplets and get into the water. They just do so at a
01:19 slower rate.
01:19 **Q.** And how -- in particular, were there mechanisms with
01:19 regard to the *Deepwater Horizon* oil spill that enhanced this
01:19 solubility of the -- of the high-end PAHs?
01:19 **A.** Well, dispersions matter a lot. And I think dispersions
01:19 in this particular spill, probably more significant in this
01:20 spill than many other spills, because you have dispersions at
01:20 depth and dispersions at the surface.
01:20 It's the dispersions which cause little small
01:20 droplets that gives an awful lot more surface area --
01:20 **Q.** And do you --
01:20 **A.** -- for those compounds to get out.
01:20 **Q.** And do you have a slide explaining dispersion and its
01:20 importance?
01:20 **A.** Yes, I do.
01:20 **Q.** Please call the next slide, D-32612-A.
01:20 So you started to explain it. Can we just -- one
01:20 more time, what is dispersion?
01:20 **A.** Dispersion is just the forcing, so to speak, of small
01:20 droplets of oil into the water column. In this cutaway
01:20 diagram, a cartoon here, you see the dispersion that was in the
01:20 bottom plume coming out there. There's also dispersion at
01:20 the -- in the surface waters where oil droplets are beat back
01:20 into the water by wave action and some physical forces there.

01:20 Certainly chemicals, meaning dispersants, can enhance
01:21 dispersions. They will increase the potential for dispersions
01:21 to be formed.
01:21 As a toxicologist, I really don't care whether the
01:21 dispersions are chemical or physical. It's the amount of
01:21 dispersions that matter because that's what enhances the
01:21 bioavailability. It enhances the exit of the large compounds
01:21 into the solution.
01:21 **Q.** And what do you mean when you say on this slide that
01:21 dispersion enhances the weathering process?
01:21 **A.** Well, there are a number of different processes of
01:21 solubilization -- solubilizing, rather, of compounds. That's
01:21 part of weathering. Evaporation. If it were at the surface,
01:21 UV hitting the oil at the surface if it's exposed to sunlight.
01:21 These -- and biodegradation, of course. All these processes
01:21 are enhanced.
01:21 The smaller the droplets, for example, looking at
01:21 biodegradation, then the more surface area there is for the
01:21 bacteria to attack and start degrading that oil.
01:21 **Q.** Do all of the aromatic compounds enter the water column at
01:22 the same rate?
01:22 **A.** No, not at all. It's all very dependent upon the
01:22 structure. Smaller, faster; larger, slower.
01:22 **Q.** Do you have a demonstrative illustrating how aromatics
01:22 become bioavailable from the dispersion process that we've been

discussing?
A. I do.
Q. Please call D-32611.
Dr. Rice, what is this animation showing?
A. This is showing first the smaller compounds are coming out at a faster rate. You do see larger compounds coming out, but the smaller ones are coming out at a faster rate. They're all coming out, just that the rates are different.
Eventually, the mass is smaller and it has a higher proportion now of larger compounds, four-ring and three-ring compounds.
Q. Dr. Shea argues that fresh oil is more toxic than weathered oil. How do you respond to that?
A. He's right when he's talking about acute narcosis toxicity. That's because the smaller compound's a single ring and the two-ring compounds come out readily and they will cause narcosis.
For the larger compounds and the chronic toxicity, which I'll talk about shortly, he's not right about that. They come out slower and it's a different mechanism, and those compounds persist for a long time.
Q. I'd like to turn to the biological half of the toxicological equation you set forth earlier.
Please call the next slide, D-32613.
Dr. Rice, could you explain the other half of this

toxicity equation?

A. Yes. The animal sensitivity part is another compartment, so to speak, compared to the chemical toxicity. It is a complex box, also. And I want to try to communicate that animal sensitivity, because there's a variety of different mechanisms and life stages, all of these interplay to -- to have a rather complex box. And I'll explain that.

Q. And so let's call the next slide, D-32614.

What are the mechanisms of oil toxicity?

A. Well, there are many mechanisms. There's a lot of biological targets, so to speak, for the various PAHs to -- to attack. There's cell membranes, there's organelles within the cells. There's -- DNA can be broken, for example. If enough cells are damaged, then that means the tissue is damaged; and if enough tissues are damaged, then there's a whole organism that is damaged that may suffer mortality or at least reduced fitness.

The mechanisms -- there are two major classes, so to speak, of toxicity. There is the acute narcosis toxicity and the chronic toxicity.

The acute narcosis toxicity is relatively rapid. Here the neural processes are affected, membranes, and that causes often a depression in the respiratory tissue, whether it's a human breathing, you would stop -- you would reduce your breathing, or if you're a fish, your opercula may stop or slow

01:25 down working. And it leads to a relatively rapid death. If
01:25 you don't get enough oxygen over a period of time, you'll
01:25 certainly die. And that was -- that's what acute narcosis is
01:25 about.
01:25 The other form of toxicity is chronic. It is a much
01:25 slower type of toxicity. It's attacking, of course, the cells,
01:25 organelles within the cells, the DNA, the tissues, all those
01:25 things that I had mentioned earlier. The whole organism can be
01:25 affected if you have enough cells or tissues. Certainly these
01:25 will reduce the -- the fitness of the animal over time.
01:26 Sometimes these are called sublethal and some of them
01:26 are, in fact. In growth, for example, you can decrease the
01:26 rate of growth, which might have an ecological effect, meaning
01:26 the animal is slower growing and going to be prey longer. But
01:26 it also applies to cancers. Think of that pendulum swinging
01:26 the other way, so to speak. That's a form of chronic toxicity,
01:26 but to call it sublethal is not appropriate.
01:26 So those will eventually lead to death; it's just
01:26 going to take a longer period of time for that death to play
01:26 out.
01:26 **Q.** What is the role of life stage in determining toxicity?
01:26 **A.** Well, life stage has a huge impact on the sensitivity of
01:26 the animal. We -- if you look at us humans, we, of course,
01:26 think babies, of course, are more sensitive and vulnerable, and
01:26 that's true. The same thing in fish embryos. Fish embryos are

two and three orders of magnitude more sensitive than, say, the adults that they come from.

Different species have some differences in toxicity, but I think there's more of a difference in toxicity -- orders of magnitude difference between the embryonic stages compared to the adults.

Q. What is phototoxicity?

A. Phototoxicity is where a UV wave-length, sunlight, strikes a molecule and energizes it, makes it more toxic. If this happens in the water, it's not as big a deal.

If it happens inside a cell, in other words, a -- take an embryo or a larva has a benzoapyrene molecule in it, the sunlight strikes that benzoapyrene molecule and it energizes it and makes -- and it increases the toxicity at least an order of magnitude, some people claim as -- as much as two orders of magnitude.

Now, that molecule is already toxic, but the UV radiation makes it even more toxic, and that's pretty critical. This is, I think, an important process with embryos and with larva. They're up near the surface, they're in the top 1 and 2 meters, for example, where sunlight, UV rays, can penetrate. And it's also these animals are translucent.

If you had a juvenile that has scales and pigment, the UV light doesn't penetrate that. So even though it might have, say, a benzoapyrene molecule in the liver, the UV can't

touch it.

But if it's in that same liver, so to speak, and a larva that has no pigment in it, then that molecule can be energized and be made more toxic.

Q. And I'd just like to touch back on a point you just raised about liver. In terms of the life stage, what is the reason why early life stages are more sensitive, in your opinion?

A. Well, they have fewer -- I'll call it tools, for lack of a better word, to detoxify, for example. The liver is a great detoxifying tissue. All tissues have some level of ability to detoxify. The liver is kind of like Grand Central Station for this purpose. And, of course, a juvenile or an adult has a fully formed liver and will be functioning in this way.

In the case of an embryo, there may be a liver there, but it's not functioning in that capacity yet and so it just doesn't have the resources or the tools to combat toxicity as much as, say, a juvenile or an adult.

Q. Dr. Rice, I'd like to turn back to your opinions in this case regarding the potential serious toxicological harm. What is your opinion with regard to the potential for toxic exposure in the Gulf of Mexico as a result of the *Deepwater Horizon* spill?

A. Well, there are two parts to the question, exposure and then harm. And regarding exposure, there is a reason to believe that there's significant for the potential. The

18,000 database, sample database, for example, has many examples of toxic concentrations in it.

Q. And in what level -- in what sections of the Gulf did you find potential for toxic exposure?

A. Several areas. Particularly the surface, upper 2 meters, the plume area where the big extensive plume existed, those are areas where oil came ashore and affected wetlands in Barataria Bay, for example, and killed the fish habitat.

Q. What information did you consider in forming your opinion regarding exposure?

A. Several pieces of data. They include the 18,000-sample database, several peer-reviewed publications, the satellite report.

Q. Have you prepared a slide summarizing a few of those sources?

A. Yes.

Q. Please call D-32615.

And what are some of these sources that you considered in your assessment of exposure?

A. Well, the one on the far left, for example, is the Joint Analysis report on the plume, where it existed, et cetera. The ERMA report, which has the satellite data that has the footprint -- cumulative footprint over time.

The -- I got a couple of peer-reviewed publications are there. One's Camilli, one of them is Diercks that report

on -- on the plume. And most importantly, there's the 18,000-sample database there that has the PAH chemistries within it.

MS. FIDLER: For the record, Your Honor, these are the Joint Analysis Group, *"Deepwater Horizon* Oil Spill Review of Subsurface Dispersed Oil and Oxygen Levels Associated with the *Deepwater Horizon* MC252 Spill of National Significance," TREX-232045.

The ERMA database screen shot is TREX-13249.

The article by Camilli, et. al., "Tracking Hydrocarbon Plume Transport and Biodegradation at *Deepwater Horizon*" is TREX-231375.

Article by Diercks, et. al., "Characterization of Subsurface Polycyclic Aromatic Hydrocarbons at the *Deepwater* Site," TREX-232664.

And then with regard to the Gulf Science data Web site, this is a screen shot. There are actually four TREX documents associated with that because they're databases. It's TREX-233140, TREX-242621, TREX-242677, and TREX-242678.

BY MS. FIDLER:

Q. Dr. Rice, did you also consider a paper by Montagna, et. al.?

A. I did.

MS. FIDLER: And, Mr. Jackson, could you please call TREX-232045. That's not it.

01:33 All right. Well, we'll see if we can fix that later, Your Honor, to get the right TREX number for that article.

THE WITNESS: It's 41.

MS. FIDLER: 232041.

We can correct this later, Your Honor. It's the "Deep Sea Benthic Footprint of the *Deepwater Horizon* Blowout." We'll get the TREX fixed short.

THE COURT: Okay.

BY MS. FIDLER:

Q. Dr. Rice, did you do your own analysis of the NRDA water chemistry data?

A. Well, I analyzed the sample -- I didn't analyze any chemistry samples, but I did analyze the database, yes.

MS. FIDLER: And since we have it here, Your Honor, this is TREX-232041, as Dr. Rice thankfully identified for us.

BY MS. FIDLER:

Q. Turning back to your analysis of the NRDA water chemistry data, where is that analysis set forth?

A. You mean in my report, it's in Appendix B of the third-round report as corrected.

Q. And, Dr. Rice, turning to the second part of your findings, what is your overall conclusion regarding the potential and actual toxicological effects of the *Deepwater Horizon* spill?

01:34 **A.** I think there is certainly the potential for harm, and that's evidenced by several of the peer-reviewed papers that I've seen come out of the spill.
01:34 **Q.** And have you prepared a series of slides elaborating on this opinion?
01:34 **A.** I have.
01:34 **Q.** Please call D-32616.
01:34 What are some of the sources that you relied on in forming your opinion regarding toxic effects?
01:35 **A.** I relied on a number of papers, but these four are quite important. There's two that deal with offshore species of fish embryos by Incardona and the second one by Mager. And then the other two are killifish embryo toxicity type papers done by Whitehead and also by Dubansky.
01:35 **Q.** For the record --
01:35 **A.** Et al.
01:35 **Q.** Sorry.
01:35 **A.** Excuse me.
01:35 **MS. FIDLER:** For the record, Your Honor, these are the Incardona, et al., *"Deepwater Horizon* Crude Oil Impacts, The Developing Hearts of Large Predatory Pelagic Fish," TREX-013333.
01:35 Mager, et. al., "Acute Embryonic or Juvenile Exposure to *Deepwater Horizon* Crude Oil Impairs the Swimming Performance of Mahi-Mahi," TREX-013338.

TREX-231494 is the Whitehead, et. al., study, "Genomic and Physiological Footprint of *the Deepwater Horizon* Oil Spill on Resident Marsh Fishes." And, finally, TREX-231426 is by Dubansky, et. al., "Multitissue Molecular, Genomic, and Developmental Effects of the *Deepwater Horizon* Oil Spill on Resident Gulf Killifish."

BY MS. FIDLER:

Q. I'd like to understand these studies a bit more starting with the significant effects that were found in these studies. Let's turn to the next slide.

Please call D-32617.

Now, before we begin, Dr. Rice, what is pericardial edema?

A. Pericardial edema is a swelling. In this case, it's around the heart. That's the pericardial part. Edema is the swelling part. And what this is, is a picture of yellowfin tuna here of embryos. The one on the right is the affected one that's been exposed to oil. And you see a very large space, it looks kind of empty, to be honest, around the heart there. The atrium is labeled.

Q. And why is this a chronic effect?

A. Well, it's a chronic effect because this animal is not dying on a very short scale. It's not dying due to narcosis. There is a brain. Basically, you have to affect the neural system in order to have a narcosis effect.

There's certainly a brain that's developing in this embryo. But at this point in time, it is not in control of the animal. It's not controlling the heart rate. It's not controlling any structures, really, except for maybe the eye. So if there's an effect here, it's going to be on other -- other targets, so to speak.

Q. What is the source of this slide?

A. This is from the Incardona paper. And this is where he's looking at the heart rate.

Q. Okay. Now, Dr. Rice, can you please explain what's happening in this slide with the two species?

A. I can. Let's look at the -- well, let's look at the control first. You see there's a heart pumping there. If you have -- it's pumping away. This large sac area underneath here is the yolk, along with the pericardial space.

Q. Dr. Rice, do you have -- I'm sorry. Do you have a pointer?

A. I do have a pointer.

Q. Thank you.

A. So the heart is right in that area on this animal. And if you count the heartbeats -- I'll count them real quick -- there's one, two, three, four, five, six.

Now, let's focus over here on this animal. The heart is right there, and you see the heartbeat is quite a bit slower. Let me count them briefly. One, two, three, four. So

you can see that the rate is very substantially reduced. This is an important effect because the heart is circulating the nutrients that are in the yolk on around to the rest of the tissues, the backbone, the fins, the other viscera that's developing. And those tissues are going to grow out of the food, so to speak, supplied from the yolk via the heart. So my point is that if the heart is affected, then you can expect that the downstream parts are affected.

This edema by itself, the swelling is -- well, if we had swelling in our ankles, for example, we may need to take a pill or something, but it's not life threatening. But a swelling around my pericardium, for example, I need to go to a hospital if I'm going to survive. It's that level of impact on the heart. And as you see, the heart rate is very reduced there.

Q. Dr. Rice, have you prepared a slide showing the kinds of affects that result from pericardial edema?

A. Yes, I have.

MS. FIDLER: Please call D-32618A.

BY MS. FIDLER:

Q. Dr. Rice, is this that slide?

A. It is.

Q. And it's titled *"Deepwater Horizon* Embryo Toxicity Studies Demonstrate Significant Effects."

Starting on the left, can you explain the -- can you

01:40 explain the fish in this slide?
01:40 **A.** I can. There's two studies here. The one on the left is
01:40 the Incardona study with three species. The one on the right
01:40 is the Mager study with mahi-mahi. I'll explain that in a
01:40 second.
01:40 Starting with the three species that are over here on
01:40 the left, the top panel is looking at the controls. There's a
01:40 bluefin tuna and then a yellowfin tuna and then the amberjack
01:40 down there. Those are the controls. They're developing pretty
01:40 well.
01:40 On the right you see the oil-exposed animals. The
01:40 first thing that pops out to me is the edema and also the bent
01:40 spines. This is a very customary -- or I shouldn't say
01:40 customary -- a routine finding, so to speak. When you expose
01:41 embryos to oil, they often have this scoliosis or bent spine
01:41 type effect. The edema, of course, is very common also.
01:41 The fins are also often easy to detect that they're
01:41 messed up. If we look at just the bottom animal where we have
01:41 a nice control, and then these guys, the tail area there is
01:41 messed up also. So the lowest dose that was causing this
01:41 effect in the bluefin tuna was .3 parts per billion PAH, a
01:41 pretty low number.
01:41 The -- the yellowfin was a little bit higher at
01:41 1 part per billion, and higher yet for the -- for the
01:41 amberjack, 6 parts per billion. Nevertheless, these are all

low part per billion effects.

Let me explain the significance and impact over here in the mahi-mahi study done by Mager, et al. First of all, they expose the embryos to 1.2 parts per billion PAH for 48 hours. And he gets the similar effect. He's getting significant edema. This is a lot more edema down here compared to the control. So he's seeing a similar effect that Incardona did in his embryo test..

But what he did different is that he grew these -- the survivors out about -- about a month to get small juvenile fish and then he did a performance test with them. And what he found was he had a significantly reduced swimming performance in the 1.2 parts per billion PAH exposure that lasted only 48 hours as an embryo.

And that's kind of evidence that the heart was affected, at least during the embryo part, and had downstream effects that later show up when he did the performance tests some 30-odd days later.

Q. And what's the significance of a reduced swim performance?

A. That will probably have a large effect on survival. Certainly these animals that have scoliosis and whatnot, they are basically toast. They are not going to survive in the environment. They are not going to have the capability to swim and avoid predators. They may not die from the chemistry, from the PAH toxicity directly, but they will not survive in the

environment.

These guys here certainly will survive for a while. But the ones that can't swim as fast, they're called prey.

Q. Dr. Rice, BP's expert, Dr. Shea, describes these studies as novel research results. Do you agree?

A. No, I do not.

Q. Have you prepared a slide summarizing the bases for that opinion?

A. Yes, I have.

MS. FIDLER: Please call D-32619.

BY MS. FIDLER:

Q. Why do you disagree with Dr. Shea's characterization?

A. That's because there's a history in the literature of other studies that have found embryo toxic effects at low part per billion.

Over here on the right are the four species that we were just looking at in those embryo toxicity slides, and then these are all studies prior to that.

There's pink salmon studies, for example, that we've done in our lab in Alaska. Those are a species that are fairly distant, I think, from yellowfin tuna, and yet the concentrations are -- that cause effects are down in that -- that area. We saw edema, for example, in those. We saw scoliosis, a bent spine problem, in exposed pink salmon. So here you have one of most extreme fish that are removed, and

yet you get a similar result in terms of the effect, and you're getting it at similar doses.

Several other studies from other labs, herring and the fathead minnows, Japanese medaka, they're all showing low part per billion effects on those embryos also.

Q. Do you think -- is it your opinion that the *Deepwater Horizon* studies are corroborated by these earlier studies?

A. Yes, I think -- yeah.

Q. Just to clarify.

Not all of these studies involved MC252 oil; correct?

A. Correct. Only the last two studies that we're talking about from Incardona and Mager were using Macondo 252 oil. All the others were using some other oil source. The ones in Alaska, for example, were using *Exxon Valdez* oil. But the other studies were using other oils.

Q. Is it appropriate to use studies with different oils in assessing the potential toxicity from *the Deepwater Horizon* oil?

A. In principle, the answer's certainly yes. As you see here, you get similar effects at similar concentrations. So that right along tells you that. And then there's a reason.

Each of these oils do differ in -- in chemistry a little bit. This -- depending on what formation it came from, but yet they all have an aromatic fraction within them. They may have a little bit of differences in -- in percentages of

aromatics, but they're all going to have those same aromatics.

And then on top of that, the water is extracting out those aromatics and it's doing so in proportion to the chemistry, to the size. So you see the same compounds, the same pHs as, for example, the very next one, Valdez, are the same pHs that are in the Macondo oil.

Q. Did you look at the chemistry of MC252 as it compared to the Alaskan oil tested in these studies?

A. Yes, I did.

Q. And was it -- was it similar? What's your opinion on the similarity?

A. Yes, it was similar. And Incardona has, you know, studied -- not this one here with the bluefin tuna, I also looked at that and compared both the effects, meaning the effect of *Deepwater Horizon* and the effect of Macondo oil on zebra fish. Got the same result, the same low PAHs, same parts per billion type of effect also.

Q. You stated that these are not all Gulf species. Is it appropriate to use tests on other species as a threshold for risk to Gulf species?

A. Well, I think your highest priority would be to use Gulf species, but certainly these results corroborate that if you want to talk about embryo toxicity, embryos from other species do corroborate these results and are predictive that -- that you would get that effect.

01:47 **Q.** Did you look at whether the waters of the Gulf had exposure levels that reached the toxicity thresholds found in these studies?

01:47 **A.** Yes, I did.

01:47 **MS. FIDLER:** Please call D-32620-A.

01:47 **BY MS. FIDLER:**

01:47 **Q.** And I'd like to start -- I'd like you to explain this slide, starting with the source of the graph. Where did the -- where did the graph come from?

01:47 **A.** This graph is produced in the -- up in the C/B of my Round 3 report, as corrected.

01:47 **Q.** And what is the key on the -- on the far right corner?

01:47 **A.** The key in the far right corner here, this box, contains the concentrations of PAH in them. So blue, for example, is .3 to .5 PAH; green, .5 to 1; 1 to 2, et cetera. So this is the concentrations as they break out.

01:48 **Q.** And what are the bars? What do the bars represent?

01:48 **A.** What we did is we created the 18,000 database and sorted it in various ways. So, first of all, these are sorted by month. So you've got May, June and July. So these are the samples from that time period.

01:48 Secondly, we sorted only the top two meters. So this is the top 2 meters. And these are the samples from May, June, and July and the top 2 meters that are in the database within the footprint for those months.

01:48 **Q.** And so -- and what do the fish represent on the left?
01:48 **A.** The fish over here are the species that we've just been talking about in the Incardona studies and the Mager study. So there's the bluefin, yellowfin, and amberjack that are there, the mahi-mahi from the Mager study. And those are then -- the threshold of effect that they had breaks out into these bars.

So let's look at just the month of May, for example. So 59 percent of the samples, for example, are .3 parts per billion or greater. So that's -- that's that story. And June, a little bit higher, almost -- a little bit over 70, 72 percent or .3 parts per billion or greater in those top 2 meters. It goes down in July.

And when we look at the bluefin tuna, it's at -- the threshold effect from that study was at that level. If we look at 1 part per billion, that's this level, 40 percent of the samples in May had a concentration of 1 part per billion or greater, and that's a threshold of effect that Mager was getting for that mahimahi species.

Q. Dr. Rice, you mentioned the Whitehead and Dubansky studies, and I'd like to turn to those. Dr. Shea doesn't rely on the Whitehead or Dubansky results in his analysis of potential toxicity, and actually rejects the Dubansky paper.

Do you think that's appropriate?

A. No, I do not.

Q. Have you prepared two slides explaining why the killifish

results are important to the analysis of potential toxicological effects from the spill?

A. Yes, I have.

MS. FIDLER: Please call D-32622.

BY MS. FIDLER:

Q. And this slide is titled "Field Exposure: Oil Exposure to Adult Killifish Demonstrated." Can you explain this slide, please?

A. Right. This is basically the Whitehead paper. What he did is he went out to Grand-Terre and also some other unoiled sites, Grand-Terre Island down here in Louisiana. And from this picture here -- this is taken on the site -- you can the oil impinging upon the wetlands, shore lands there.

This habitat area is just prime killifish habitat. When it's flooded by high tide, the animals go in there and forage. And so you can see just from the picture that this habitat is physically -- physically exposed.

In addition to that, Whitehead also analyzed for CYP1A, P450 response in various tissues of these adult killifish. And what this means is that -- and there was a very significant increase, of course, in these Grande-Terre samples. What that means is that those fish were exposed.

This particular end slide has a very, very quick response in membrane invertebrates, fish being one, where they'll elevate this enzyme in response to PAH exposure. This

doesn't necessarily indicate harm, however.

And -- but he did analyze also looking at hyperplasia in gill tissues. And what that means is that the tissues are kind of growing together.

My hand, if this were a gill, for example, these would be lamellae coming out, and their function is to increase the surface area for extracting oxygen out of the water. In hyperplasia, those grow together. They are basically inflamed and they grow together. And basically the surface area now is severely reduced.

The animal can still live, but now his ability to be an athlete, so to speak, to avoid a predator is very much reduced because he's just not going to have the oxygen extraction capacity. So he can walk, so to speak, but he can't run, would be an example.

So this is an indication of actual harm. So these animals were harmed in the environment.

And the Dubansky paper continued this work. Dubansky was a coauthor with Whitehead. He continues the work in 2011 and continues to find a P450 response in those fish in 2011, meaning that the oil exposure continues.

Q. And turning to the next slide D-32623-A, it says, "Lab: Significant Effects on Killifish Embryos from Field Sediment Exposure Demonstrated." Can you explain the slide, please?

A. This -- this is directly from the Dubansky paper. So what

he did is when they're sampling in 2010 and 2011 is they took sediments back to the lab.

Here he exposed embryos, killifish embryos, to those sediments. And first of all, he finds an elevated P450 in the embryos. That indicates that the embryos were truly exposed and not separate from the exposure.

He found similar results that we saw on the Incardona and Mager papers, saw edema around the heart, pericardial edema. He saw a decreased heart rate, and that's shown in this diagram here where -- the red box, Grand-Terre samples in 2010 and 2011 are significantly reduced from the control sites, the unoiled sites.

The asterisk indicates that those are significantly different. The two -- there's a little bit of difference in the readings between 2010 and '11, but they are statistically not different from each other. The arrow bars overlap the means, for example, but they are both statistically significantly different from the -- from the control site.

So the heart rate was impacted and ultimately, the -- there's decreased hatching success in these oil-exposed animals.

Q. Can you explain your second -- your last bullet here?

A. The last bullet just means that the effect was observed in 2010, and it was repeated a year later with sediments collected in 2011. Got the same result, as I just indicated.

That just means that the oil exposure of those sediments continues, that it -- the oil exposure just didn't go away through weathering or microbial degradation. It's still there.

Q. Did Dubansky and Whitehead look at any other indicators of oil exposure, potential harm, besides the ones we've talked about, the P450 enzyme response and the embryo toxicity?

A. They did. They tested genetic genomics responses, and what they're looking for are upregulated genes or downregulated genes. They had several thousand respond in both 2010 and 2011.

This is from the adults. For example, it's -- that indicates that the animal's responding. It's a little bit hard to equate that to harm. It's hard to know what many of these different genes are doing. They're responding, but that doesn't tell me that they're actually harmed. Decrease in heart rate, decrease in hatching success, that's real harm. Hyperplasia in the gill, that's harm.

Q. Dr. Rice, I would now like to turn to Dr. Shea's toxicity analysis and your response to it. Have you prepared a series of slides explaining your response to Dr. Shea's analysis of potential toxicological harm?

A. Yes, I have.

MS. FIDLER: Please call D-32624.

01:56 **BY MS. FIDLER:**
01:56 **Q.** Can you summarize your disagreements with Dr. Shea for the
01:56 Court. And afterwards we'll go into them in a little bit more
01:56 detail.
01:56 **A.** Yes, I can. Briefly, we both looked at the same water
01:56 chemistry database, that 18,000-sample database with all the
01:56 PAH chemistries in it, and we both have a common understanding
01:56 of PAH composition and PAH concentration. They're both
01:56 important.
01:56 Underlying after that, though, we begin to diverge.
01:56 Basically, first -- my first criticism is that he rejects
01:57 the -- the literature that was in support prior to the
01:57 *Deepwater Horizon* embryo toxicity work that I talked about
01:57 earlier. And then more specifically, he's rejecting the
01:57 Incardona and Mager papers, the Whitehead and the Dubansky
01:57 papers. He's rejecting that science. He's not evaluating them
01:57 in terms of relative to his toxic unit approach.
01:57 My second item is that he's rejecting -- he's
01:57 criticizing their methodologies, especially the mixing method
01:57 and that sort of thing. That's one thing.
01:57 Third, he's using a toxic unit approach, and I think
01:57 he uses that rather inappropriately at times. Fourth, or
01:57 lastly, he's also diluting the toxic water results via some
01:57 summarizing statistics and graphics.
01:57 **Q.** Okay. Since you've discussed the first bullet, I'd like

01:57 to turn to your second point regarding methodology.
01:58 To clarify for the Court, what kind of tests were
01:58 involved in the -- in the studies you've been talking about,
01:58 the embryo studies?
01:58 **A.** The embryo toxicity studies, those are all laboratory
01:58 bioassays.
01:58 **Q.** And very generally speaking, what is a laboratory
01:58 bioassay?
01:58 **A.** Basically it's where you're exposing the subject animal --
01:58 in this case, the embryos, you're exposing them to a series of
01:58 solutions with oil in them, mixed into them. Plus, you'll
01:58 always have a control to compare the response that you're
01:58 measuring, whether it's survival or heart rate or whatever.
01:58 **Q.** And what are you looking for in a -- in a bioassay?
01:58 **A.** You're looking -- in this case, you're looking for what is
01:58 the threshold of effect. You're trying to find what doses are
01:58 safe, what doses are harmful.
01:58 **Q.** You've stated you've conduct -- conducted bioassays
01:58 before. How many have you conducted?
01:58 **A.** At least hundreds, probably in the thousands.
01:58 **Q.** And what species have you tested?
01:58 **A.** A number of species. Of course, they're mostly from
01:59 Alaska, the Arctic down to southeast of invertebrates, such as
01:59 shrimp and crabs and mussels, on up through fish, the
01:59 vertebrates fish, and also a number of life stages going from

embryos on up to juveniles and adults.
Q. Turning specifically to some of Dr. Shea's critiques regarding the methods, I'd like to call D-32625.
All right. Starting with the first critique listed, could you explain Dr. Shea's critique of the methods you and other researchers such as Drs. Incardona and Mager have used?
A. Well, basically his first criticism, or a large criticism is that he states or complains that the HEWAF method, that's high-energy WAF, water accommodated fraction, is a nonstandard mixing method.
Q. And I'd like to break this down a bit. What it is a water accommodated fraction, or WAF?
A. Water accommodated fraction means that those PAHs are inserted into the solution.
Q. And -- and what is a HEWAF?
A. HEWAF means high energy, so a lot of energy is used in the mixing in order to get the PAHs into solutions.
Q. And what role does the mixing method play in generating a WAF?
A. The mixing method has a -- has a lot to do with -- with the resulting composition. If you're using a slow mixing method, then you'll get a solution that is dominated by the light ends, single rings of fresh oil and not weathered. Or if it is, it will be the -- weathered a little bit, it will be the two-ring compositions.

If you use high energy, then you're going to get some of these three -- a lot of these three- and four-ring compounds inserted into the solution. So you affect the composition quite significantly, depending on which -- what method you use.

Q. And if I can slow you down a little bit, because that went pretty quickly.

What do you then do with the WAF?

A. Well, you collect the -- the WAF, and that's what you dilute to various -- various intermediate concentrations, and you expose your subject animals to that.

Q. Okay. Is there a standard legally required mixing method for conducting bioassay research?

A. No, not at all.

Q. And have you used a variety of mixing methods in the research you've conducted?

A. I have. I've used energy methods such as a slow mix that Dr. Shea prefers and on up through a series of paint stirrers and including high-energy WAFs out of blenders.

Q. How do you respond to this critique by Dr. Shea regarding the use of high-energy blenders to create HEWAF?

A. Well, certainly, you get different compositions, but -- out of different mixing methods, but I don't buy off on that. Basically what you really need to know is what is the composition and what is the concentration. And if you're trying to mimic the -- what you find in the environment, then

you need to adapt your mixing method that will give you the type of composition you need.

So in the case of the Gulf waters, which had a lot of dispersion -- dispersions of depth, dispersions at the surface, chemically enhanced probably, there is a lot of three-ring and four-ring compounds inserted into solution by -- in -- in the environment.

And so Incardona, for example, used the HEWAF in order to produce compositions and concentrations that were similar to what he found in the -- in the environment.

As a matter of fact, in his paper, he has those three different species, he's actually taken a sample out of three different cruises and copied, if you will -- "mimicked" I guess would be a better word -- mimicked, the composition that was found in samples from each of those three cruises.

Q. So just to clarify, he's making that sure that the exposure -- the composition of the PAHs in his exposure solution closely approximates, if not matches as closely as possible, what he actually saw in the field. Is that a fair assessment?

A. Yeah. Another way to put it, he's making sure that his exposure solutions are relevant to the environment, both in composition and in concentration.

Q. Would the slow mixing methods preferred by Dr. Shea, the -- the so-called standard methods, have been better for

achieving this?
A. Not for this -- not for this spill. He couldn't have inserted the three and four rings into the solution using that method; therefore, there would have been a lot of samples that he couldn't have mimicked that were found in the environment.
Q. How are you able to know that a PAH solution is mimicking the field conditions?
A. You have to have some very sophisticated analysis. These are commonly called GCMS, that's gas chromatograph mass spec. The gas chromatograph separates out the individual PAHs into the various component parts, and then the mass spec analyzes, determines what the quantity is of each of those different PAHs.

So that gives you concentration and composition. It takes that sophisticated analysis to do that.

MS. FIDLER: And can we go back to the last slide.
BY MS. FIDLER:
Q. Can you please describe the second critique you've listed here?
A. The second critique from Dr. Shea is that he says that the lab conditions represent the worst-case scenario.
Q. And how do you respond to that?
A. I don't agree with that.
Q. Why not?
A. Well, the lab situation is kind of a perfect environment,

so to speak, except for having the toxin, of course. But it doesn't have predators, it doesn't have a changing physical environment, it doesn't have a change in temperature or salinity or UV, for that matter. So it's kind of a perfect world, so to speak.

The bioassays that we've done, our experience, I should say, have found that when you expose an animal and he's released in the environment, his survival potential is actually less than what you might predict just from the chemistry of the toxicant alone.

Q. I want to clarify briefly what difference exists between your method of analyzing the water chemistry and the one used by Dr. Shea. First, on the exposure side, is there any difference in the water chemistry data that you and Dr. Shea looked at?

A. No, we looked at the same sample set and the same PAH chemistries contained within that.

Q. On the issue of potential biological effects side, did both of you use a toxicity threshold to analyze whether the data would be harmful --

A. We did.

Q. -- I mean that the results would be?

A. We did. We both used a threshold.

Q. What toxicity threshold did you use?

A. I was using the toxicity threshold that was derived

specifically from Incardona that was .3 parts per billion PAH. That's the lowest value we got that was harmful.

Q. And what is Dr. Shea's toxicity threshold?

A. He's using a modeled toxic unit model, and his toxic threshold is 1.

Q. Have you prepared a series of slides explaining the TU model?

A. I'll try.

MS. FIDLER: Call D-32628.

BY MS. FIDLER:

Q. What, very briefly, is the toxic unit approach?

A. Toxic unit approach is a -- is a modeling approach, basically. Each of the PAHs are separated out. They have a different potency. Remember I said that as you go up in structure, you're actually increasing the toxicity. So the potency is -- changes, and these are given weighting factors.

And at the end, you add up all the weighting factors and add up -- if it's greater than 1, then -- then it's harmful. If it's less than 1, it's thought to be safe.

Q. And what was the intended purpose of the toxic unit approach?

A. Well, the intended purpose is that it's a screening procedure, and that the toxic units add up based on the composition assigned weights. And it if it adds up to greater than 1, then it's supposed to stimulate or trigger a site or

02:07 species-specific analysis.
02:07 **Q.** Are there limitations to the TU approach?
02:07 **A.** There are.
02:07 **MS. FIDLER:** Please call the next slide, D-32629.
02:07 **BY MS. FIDLER:**
02:07 **Q.** What are the limitations of the TU approach?
02:07 **A.** Primarily, the toxic unit approach is based primarily on
02:07 modeling coming out of a series of acute bioassays, acute
02:08 toxicity studies. And the mechanism here is the acute toxicity
02:08 or narcosis mechanism. That's the -- that's the basis for it.
02:08 And if your goal is to assess acute toxicity, then
02:08 actually this toxic unit approach is -- is relatively valid.
02:08 The EPA scientists, however, that developed this recognized
02:08 that the toxic unit approach might be underprotective for other
02:08 toxicity mechanisms. Remember I talked about there's a series
02:08 of mechanisms, acute toxicity, then chronic toxicity.
02:08 In the case of the embryos, for example, the neural
02:08 part has not kicked in yet, so you can't have an acute narcosis
02:08 toxicity for them. So trying to adapt this down to the chronic
02:08 toxicity was a limitation. They've recognized this. They have
02:08 some chronic toxicity tests within -- within the modeling, but
02:09 they're very limited.
02:09 They're very limited in the number, they're very
02:09 limited in the species, very limited in the number of pure
02:09 compounds they use. They don't use very many. They're very

limited in the number of life stages. There's only a few that -- a few fish species, for example, that have embryo information in it. And most importantly, they're very limited in the toxicity mechanisms that they're measuring and quantifying in those tests.

So consequently, this adds quite a few layers, so to speak, of uncertainty when you're trying to adapt this toxic unit approach to a chronic-type situation, chronic-type test. And for me, that is why this is still a screening tool, particularly at the chronic toxicity level.

Q. Moving to your criticism that Dr. Shea inappropriately used this TU model. I'd like to call the next slide, D-32630-A.

BY MS. FIDLER:

Q. What is your criticism of Dr. Shea's use of this model?

A. Well, basically, I don't find it as safe. Again, I said it's relatively okay for predicting an acute narcosis, but when we get down to the embryos and other toxicity mechanisms, chronic toxicity, I just don't think it's a safe way to go.

So the first bullet here says that Dr. Shea ignored the requirement where if you get a toxic unit greater than 1, for example, that you're going to stimulate a site or species-specific investigation. He hasn't done that.

The second bullet refers to this diagram I have here, a bioassay, an embryo test for Pompano coming out of BP's

exposure tests that they have. And if we look at the details of this -- and I draw your attention to this group of animals here.

The people that conducted the tests identified those as being significantly different than the -- than the controls, and so they're circled in red. This is their assessment that it's significant.

I've also got a line drawn here right in the middle where the toxic units are calculated at 1. So here you see, when you average these three together, you get an average mortality of about 30 percent. And that's mortality. That's not effects or edema or growth or some other sublethal effect; it's mortality.

So here you have 30 percent mortality, and it's coming out at a toxic unit of about, say, .8, roughly. So right here is an example. It's just one -- one example. It's an example where the toxic unit approach of 1 is not safe for that type of assay chronic test, if you will, on an embryo test.

Q. Your slide mentions there was also a test on amphipods. Was that a water or a sediment test?

A. That was a sediment test.

Q. And where was the sediment coming from?

A. The sediment was coming from -- sediment was taken at depths in the Gulf after the spill.

02:12 **Q.** So would your concerns about Dr. Shea's use of the TU model to assess potential harm also apply to Dr. Shea's analysis of harm from sediment exposure based on the same threshold?

A. It would. In this case the amphipod TU is quite low, much lower than 1.

And I didn't look at a lot of these. I just looked at a couple. And this is one example that it wasn't safe -- it wasn't a prediction of safe.

Q. I'd like to turn to your final criticism that Dr. Shea's water chemistry analyses dilutes -- dilutes the potential for harm. Have you highlighted four examples of this?

A. I have.

MS. FIDLER: Please call D-32632.

BY MS. FIDLER:

Q. Can you please explain this slide?

A. Well, what Dr. Shea has done here is he's treated this 18,000-sample database as one large pool of samples, and he's averaged them across time, space, and depth.

Let's look at the mapping right here, for example. So the first thing I see is that these are samples from May of 2010 to July 2012. Well, for the water samples and after the well is capped, we just wouldn't expect much toxicity, of course, showing in the water samples collected in 2011 or 2012, and yet these are averaged in.

02:13 Secondly, let's go to space, meaning geography here. Look at all the samples that are collected on the inside and the outside coast of Florida. These are great samples to have taken for baseline measurements in case that slick had been swept over and impacted the coast of Florida, but that didn't happen. And yet these samples now are rolled into the database in order to calculate out the probability of -- of being there.

02:14 Lastly, is depth. He's averaged in in this particular case the sample -- all the samples at all depths. If we look at just one dot, let's take one sampling location. What that is is a sample taken near the surface water, at 2 meters, maybe, a deeper sample, let's say 10 meters, maybe 50, and then 200 and 1,000. So all these samples are rolled in, and yet we wouldn't expect significant oil concentrations in many of these samples.

02:14 And the net result that Dr. Shea gets is that if you look there in that pie wedge, looking at just the chronic benchmarks, he's getting a little less than 2 percent of them are toxic. He's saying that 98 percent of the samples are safe. And to me he's not using the right approach here.

02:15 **MS. FIDLER:** Call the next example, 326 -- D-32633.2-A.

02:15 **BY MS. FIDLER:**

02:15 **Q.** Can you please explain your criticisms with regard to Dr. Shea's analysis of surface water?

02:15 **A.** This is the surface water. And if you read the title there, this is the probability of unsafe water in May of 2010.

This is an important month, May of 2010. The spill, of course, is very active, still going on at this time. And yet when you look at how many samples are potentially toxic -- and these are from the top 200 meters -- you do not get the impression that there's anything to worry about, frankly. That would be my interpretation of the slide that he's presenting.

And the sample's similarly small maybe or the map is large. But when you compare that result to what we've done down here in the lower graphic, we've graphed out, queried the database for the samples that are in the top 50 meters. We've -- and, again, we've separated it out by months. So this is May, so it's a comparable map. And here we have the samples that are appearing in the top 50 meters that have concentrations at various levels.

So if we were to use yellow, for example, this is a .3, and then you got the higher concentrations in the reds and orange. And you certainly see a lot more samples, for example, in those waters, all within the footprint, for the most part; but still you get the impression that there's more to worry about from that slide than you do from Dr. Shea's analysis.

MS. FIDLER: And taking a look at the analysis on the deepwater side, please call the next slide, D-32634-B.

02:16 **BY MS. FIDLER:**
02:16 **Q.** Please explain your criticism with regard to Dr. Shea's analysis of deepwater.
02:16 **A.** Well, he's included this slide. There's the wellhead, but you see no samples that are identified from the plume. The deep sea plume just doesn't appear.
02:17 In the lower half of the slide -- excuse me. In the lower half of the slide, I've taken a slide out of -- a picture out of the Joint Analysis report that tracked the plume for several months.
02:17 And, of course, you see samples down there. The concentrations are not fair to compare because they're not PAHs, so we can't quite compare them to the top graph. But nevertheless, the plume was identified -- the next slide shows that it's identified by Camilli. For example, for 35 kilometers out, there's plume samples that are identified out. Those oxygen levels certainly plume out. I didn't show you this, but the -- the oxygen levels are depressed there.
02:17 There's concentrations out of the database that are at 100 parts per billion and greater. That's 100 parts per billion. Certainly, there has to be some samples that would be cause for concern -- toxic concern, and yet there's nothing appearing in Dr. Shea's analysis.
02:18 **Q.** And turning to your final slide, Dr. Rice, have you prepared a rebuttal to these analyses?

02:18 **A.** I have.

MS. FIDLER: Call D-32635.

BY MS. FIDLER:

Q. What is your response to Shea's -- Dr. Shea's analysis?

A. Well, I guess, briefly, I would want to look for where you might suspect that there would be PAH. So when we did this analysis here, we were looking primarily offshore. We've broken it out by month, because we wanted to know what -- what times of the year following the spill would you expect maybe to -- to find the oil, to be comparable to the species of concern, meaning those embryos that Incardona and Mager are studying.

We restricted our analysis to the top 2 meters. So the -- the blue bar here in the month of May, June, July, that's just the top 2 meters.

The intermediate level, we don't expect much, so that sector goes from 2 meters down to 1,000. And then we want to separate out, of course, the deepwater samples that are 1,000 meters or deeper.

And my interpretation from this slide is -- we have three critical months that are significantly greater, May, June, July, compared to August, September, October, et cetera.

The blue -- the highest bars, or the blue bars, so those are the samples of the top 2 meters. And if you look at the red here -- 59 percent of the samples in May, 72 percent of

the samples in June, 30 percent of the samples in July -- out of the top 2 meters are above .3 parts per million, the threshold that I was using from the Incardona study.

If you use the -- look at the deep samples here, they're a little bit lower, but they're still quite significant. Almost half the samples in May are above .3 parts per billion. I'm starting to get concerned at those levels.

It does drop off in June and July. But at least there's some evidence -- significant evidence, in my mind, that there's a potential for toxic harm coming from these samples. And it's -- it's just quite different than what Shea shows.

Q. And, Dr. Rice, do these toxicity patterns you've identified at the .3 part per billion toxicity threshold, do those same patterns play out at other toxicity thresholds?

A. They would. It would be the same exact pattern. If we were to drop it down to 1 part per billion, which is what I showed in that other slide that corresponds to mine, it would be right here at 40 percent. So even in the month of May, 40 percent of those samples would be toxic to a mahi-mahi embryo, for example, in the top 2 meters.

Q. And are those analyses also set forth in Appendix B?

A. They are.

MS. FIDLER: Thank you, Dr. Rice.

I have no further questions at this time.

THE COURT: All right. Ms. Karis.

02:21 **MS. KARIS:** Your Honor, would you like me to proceed now, or I wasn't sure if you wanted to take a --

02:21 **THE COURT:** I'm sorry, what?

02:21 **MS. KARIS:** I'm sorry. Have me proceed now, or did you want to take our afternoon break?

02:21 **THE COURT:** No, not unless we -- someone needs it. But otherwise, we'll go a little bit longer.

02:21 **MS. KARIS:** Okay.

02:21 **THE COURT:** I thought we'd break somewhere between 3:00 or 3:30.

02:21 **MS. KARIS:** Okay. Thank you.

02:22 Your Honor, may I proceed?

02:22 **THE COURT:** Sure.

02:22 **MS. KARIS:** Thank you.

02:22 For the record, Hariklia Karis.

02:22 And, Dr. Rice, I have you on cross-examination.

02:22 **CROSS-EXAMINATION**

02:22 **BY MS. KARIS:**

02:22 **Q.** Dr. Rice, I believe you testified, amongst the materials you considered, to use your words, most importantly, the water chemistry samples that existed for the *Deepwater Horizon* -- arising from the *Deepwater Horizon* environmental investigation; correct?

02:23 **A.** That's true.

02:23 **Q.** Okay. And you said it was most importantly the water

chemistry samples. But to be clear, at the time you issued your Round 1 report, you had not reviewed that water chemistry data; correct?

A. That's correct. I was using peer-reviewed literature that recorded some of those doses, but I did not analyze the 18,000-sample database until after the comments came from Dr. Shea.

Q. Okay. And we'll get back to that most important water chemistry data and the literature that you reviewed.

But you would agree with me that the water samples that were collected as part of the *Deepwater Horizon* environmental investigation following the *Deepwater Horizon* spill was quite extensive in terms of size and scope?

A. It was quite extensive, yes. More than any other spill I've ever seen.

Q. And you would agree that those samples were collected under good quality control assurance protocols; correct?

A. Well, I have to assume that. And the reason why I'm assuming that is because this database has not been peer-reviewed and I haven't seen the synthesis, for example, coming out from the people that gathered the data, gathered the samples, did the analyses. So I have to trust that everything in there is pretty good.

Q. And you have, in fact, trusted everything there is pretty good because you put together those charts that showed us where

you expected to see potential injury based on that water chemistry data; correct?

A. That's true.

Q. Okay. Now, you considered that water chemistry data to be reliable; correct?

A. Well, again, with one caveat, that it hasn't been peer-reviewed, that it hasn't been synthesized by the people that took the data. You know, will they ever eliminate some data, for example? It's hard for me to believe that 100 percent of those samples are spot on. But I don't know that.

Q. But in rendering your opinions in this case, as they pertain to that data -- because your Round 2 reports have such opinions as well as your Round 3 report -- you considered that data to be reliable; correct?

A. I did.

Q. Thank you.

Sitting here today, you have no reason to disagree with any of that water chemistry data after you considered whatever information about it you've reviewed to date; correct?

A. Given the caveat that I've been giving, yes.

Q. Okay. And you definitely agree that the water chemistry data is of sufficient quantity to analyze; correct?

A. I did not quite say that.

Q. Okay.

02:25 **A.** What I said is this is the most samples that I've ever
02:25 seen in a spill. But sufficient, that's a little bit
02:26 different. I would have liked to have had -- being a
02:26 scientist, I would like to have had more samples. I would like
02:26 to have had more directed samples, for example.
02:26 **Q.** Doctor -- I'm sorry.
02:26 **A.** And all those samplings are still just single snapshots in
02:26 time.
02:26 What I mean by that is if I was to go back to some
02:26 location and sample the next day and sample the next day, I
02:26 really don't know what I would get, because those are just
02:26 snapshots in time.
02:26 **Q.** Dr. Rice, you agree that the water chemistry data is of
02:26 sufficient quantity, quote, to support your conclusions, end
02:26 quote; correct?
02:26 **A.** Well, yes --
02:26 **Q.** Thank you.
02:26 **A.** -- with the caveat that I gave you.
02:26 **Q.** You're aware that the government has analyzed a large
02:26 portion of this data; correct?
02:26 **A.** Correct.
02:26 **Q.** And you're familiar with the Unified Command's Operational
02:26 Science Advisory Team for the federal on-scene coordinator,
02:27 what is often referred to as OSAT?
02:27 **A.** No, not really.

02:27 **Q.** Okay.

MS. KARIS: Let's pull up TREX-12237.1, please. Exhibit -- I'm sorry, TREX-12237.1.

BY MS. KARIS:

Q. You're familiar with this document which is regarding the sampling and monitoring data that has been collected and analyzed by the government, OSAT in particular; correct?

A. Yes.

Q. Thank you.

This report, as is shown on the bottom there, is dated December 17th of 2010?

A. Correct.

Q. That's when it was first issued; correct?

A. Correct. That's the date.

MS. KARIS: And if we can now go to TREX-12237.28.1.

BY MS. KARIS:

Q. Table 3.1 from the OSAT report contains the data that the government scientists collected and analyzed for the nearshore environment; correct? Do you see at the top there it says, "3.1, Summary of water and sediment analytical chemistry results in the nearshore zone"?

A. That's what it says.

Q. "Data sets were compared to human health benchmarks" -- we talked about those yesterday -- "aquatic life benchmarks," which is what you're talking about here today, "and dispersant

screening levels. For each benchmark (or screening level), total number of samples that were nondetect, below benchmark, or exceeded benchmarks were computed."

And they were computed by OSAT; correct?

A. That's what it says.

Q. "The total number of samples is not the same for the human health, aquatic life, or dispersant categories because not all sample were analyzed for all analytes."

And if we look here, we can see the samples collected for aquatic life and for dispersants; correct? Collected and analyzed; correct?

A. Yes.

MS. KARIS: Next slide, please.

BY MS. KARIS:

Q. For aquatic life, the total number of samples collected were 6,909; correct?

A. That's what it says.

Q. If you can go back -- I'm sorry.

And what we see is of those 6,909 samples, 5,337 had nondetects, 395 were below benchmarks, correct, again, for the water samples?

A. Correct.

Q. And then we have exceed benchmark, and you see here at the bottom where it says: "The number in parentheses refers to exceedances consistent with MC252 oil or indeterminate."

02:30 Do you see that?
02:30 **A.** I see that.
02:30 **Q.** So from these 6,000 samples -- 6,909 samples for water column -- actually, they're not all water column samples, to be clear -- these approximately 6,000 samples, 22 refer to exceedances for MC252 oil; correct?
02:30 **A.** That's what I read, yes.
02:30 **Q.** Okay. Now, you understand that "exceed benchmarks" -- you understand what that means; right?
02:31 **A.** Probably. I'm guessing -- because I haven't read this document recently. I'm assuming that that means that it exceeds the EPA benchmarks.
02:31 **Q.** Those would be the EPA's benchmarks for aquatic life; correct?
02:31 **A.** The EPA benchmarks based on toxic units, yes.
02:31 **Q.** Okay. And that was for nearshore. Now, let's look at deepwater zone.
02:31 TREX-12237.43.1, again, from the OSAT report, a "Summary of the water and sediment analytical chemistry results in the deepwater zone."
02:31 Does this report the results from aquatic life as 2,721 samples were nondetects; correct?
02:32 **A.** Yes.
02:32 **Q.** And below benchmark, 821 of those samples were below the EPA's benchmarks; correct?

02:32 **A.** That's how it reads.
02:32 **Q.** And, again, for the deepwater zone, exceed benchmarks, the number inside the parentheses, which is consistent with MC252 oil, is 63 samples; correct?
02:32 **A.** That's what it says.
02:32 **Q.** So this would have been data that was collected in 2010 showed that there were 63 exceedances of benchmarks of approximately 3,500 samples, if we take out the sediment collection; correct?
02:32 **A.** Correct.
02:33 **Q.** And, in fact, OSAT reports on the percent of exceedances for water column and sediment as being 2 percent; correct?
02:33 **A.** That's the value that's in that box.
02:33 **Q.** Now, I haven't asked you about sediment samples. You're aware that there were thousands of sediment samples collected; correct?
02:33 **A.** I'm aware. I did not analyze the sediments very extensively. I relied on the peer-reviewed literature that I was reading.
02:33 **Q.** In fact, you didn't analyze the sediment samples that were collected at all; correct?
02:33 **A.** I did not have the time to do that, no.
02:33 **Q.** So when Dr. Boesch testified earlier today that he relied on your analysis of the sediments samples, you did not do any such analysis; correct?

02:33 **A.** Well, that's not quite what I said. I didn't analyze that
02:33 database, the 18,000-sample database. I did certainly read and
02:33 review several papers, the Turner paper being a prime example,
02:34 the most recent paper showing extensive PAH in the wetlands,
02:34 and the series of samples with baselines prior to the spill.
02:34 **Q.** So to be accurate, then, you reviewed peer-reviewed
02:34 literature, some of which referenced sediment samples; correct?
02:34 **A.** Correct.
02:34 **Q.** You did not, though, go and review or analyze the sediment
02:34 samples referenced in that peer-reviewed literature; correct?
02:34 **A.** No, I did not.
02:34 **Q.** My statement is correct then? I'm sorry, I think we have
02:34 a double negative, for the record.
02:34 You have not reviewed any sediment samples, even of
02:34 the peer-reviewed literature that you looked at; correct?
02:34 **A.** Again, I've reviewed peer-reviewed literature.
02:34 **Q.** Okay. Thank you.
02:34 Now, OSAT, after reviewing those sediment samples and
02:34 analyzing them both for nearshore and deepshore made certain
02:34 key findings. You're aware of that, in that report issued in
02:35 December of 2010; correct?
02:35 **A.** Actually, I'm not aware, no.
02:35 **MS. KARIS:** Okay. Let's look at it. TREX-12237.6.1.
02:35 **BY MS. KARIS:**
02:35 **Q.** OSAT found in December of 2010 that there were no

exceedances of EPA's dispersant benchmark -- I'm sorry. Let me read it again.

"Key Findings. No exceedances of EPA's dispersant benchmarks were observed."

You were not aware of that? Is that your testimony?

A. I'm not aware of the details in this document, no.

Q. Including its key findings; correct?

A. Correct. Again, these benchmarks are benchmarks. This is a screening tool. I relied on the peer-reviewed literature more than I relied on this.

Q. You did not rely on EPA's benchmarks?

A. I did not. It's a screening tool. I was looking to review the peer-reviewed literature that was peer-reviewed.

Q. We'll talk about the peer-reviewed literature. But you're aware that Dr. Shea, he did rely on these EPA benchmarks; correct?

A. Correct.

Q. Thank you.

Now, let's look at another key finding from OSAT 1.

MS. KARIS: TREX-12237.6.2, please.

BY MS. KARIS:

Q. Were you aware that in the OSAT report, they made a key finding, Number 4, "Since 3 August 2010, less than 1 percent of water samples and approximately 1 percent of sediment samples exceeded EPA's aquatic life benchmarks for" polycyclic

aromatic -- aromatic hydrocarbons, "PAH"?

Were you aware of that?

A. No.

Q. They went on to say: "Analysis of individual samples indicated that none of the water sample exceedances were consistent with MC252."

You were not aware of that; correct?

A. Are these all -- I can't tell the context. Are all these nearshore?

Q. These are the key findings from the nearshore and offshore.

A. Okay.

Q. You were not aware of that fact, that none of the water samples exceeded the MC252 benchmarks; correct?

A. Again, the benchmarks, I agree. I am not aware -- I did not pay attention to the benchmarks.

Q. And of the sediment exceedances, only these within 3 kilometers of the wellhead were consistent with MC252. And, again, that would be the sediment -- sediment samples that you did not review; correct?

A. That's what -- that's how it reads.

Q. Now, you referenced that in your report, you relied on peer-reviewed literature, certainly your Round 1 report, and you only looked at the water chemistry samples after you got Dr. Shea's first-round report; correct?

02:38 **A.** That's correct.
02:38 **Q.** Now, at the time of your deposition, as you indicated, it was brought to your attention that there were some errors in your Round 2 report; correct?
02:38 **A.** That's correct.
02:38 **Q.** And your Round 2 report errors pertained to your review of some of the chemistry data that we've just been talking about; correct?
02:38 **A.** Correct.
02:38 **Q.** And it also pertained -- I'm sorry, then you issued a -- you had a Round 3 report that also had some mistakes; correct?
02:38 **A.** Correct.
02:38 **Q.** And, again, that was brought to your attention at your deposition; correct?
02:38 **A.** Correct.
02:38 **Q.** And to be fair, Mr. Israel brought those -- BP's counsel brought those errors to your attention during your deposition; correct?
02:38 **A.** That's correct.
02:39 **Q.** Now, before issuing your reports, you made sure -- strike that.

Before issuing your reports, you made every effort in your review to ensure that your reports were accurate?
02:39 **A.** That's true.
02:39 **Q.** And after those -- those errors were brought to your

attention, you issued some corrections?
A. Correct.
Q. In December of this year; correct?
A. Correct.
Q. And then you found more mistakes and you issued another round of corrections in January of this year; correct?
A. I thought -- I thought the corrections in December were -- I'd have to look at the dates. I thought the December -- the corrections in December were it.
Q. Sitting here now, do you know whether we were given yet more corrections to your report, including to Figure 6 in January of this year?
A. Without seeing the documents again and the dates --
MS. FIDLER: Objection, Your Honor. What happened is Dr. Rice redacted that, redacted that figure from the appendix. And it's -- as is set forth in the briefing on this issue.
MS. KARIS: It's after -- I'm happy to follow up --
MS. FIDLER: So he's withdrawn -- he's withdrawn that figure entirely.
BY MS. KARIS:
Q. Dr. Rice, why did you withdraw Figure 6 from your report in January of this year after you made your corrections in December?
A. Right now, I do not remember what Figure 6 is. I'd have to see it.

02:40 **Q.** All right. We'll pull it up shortly. But were you aware
02:40 that one of the figures from your report has been withdrawn?
02:40 **A.** I remember that now.
02:40 **Q.** And regardless of when it happened, do you know why you
02:40 withdrew it?
02:40 **A.** I'd have to see the figure.
02:40 **Q.** Okay. Now, let's look at TREX-13331.33.1.
02:41 You testified on direct examination that the
02:41 corrections to your tables were the result of some
02:41 miscalculations or computing errors; is that correct?
02:41 **A.** Well, yes. But not computing errors, I think sorting
02:41 errors would be the more appropriate way to describe it.
02:41 18,000-sample database, that's two and a half million records.
02:41 So it's a very large database. I'm not experienced enough to
02:41 sort that sort of database that large. I could ask questions
02:41 and I could interpret data once it's sorted.
02:41 But -- so anyway, what we did there is we -- we had
02:41 trouble matching Dr. Shea's analysis because of the large
02:41 samples. So the correction between Round 2 and 3 was there is
02:42 a thousand samples that we couldn't account for that were in
02:42 the database. So those are ultimately found and that
02:42 correction was made for the Round 3 report.
02:42 Then we're still off by -- well, as this particular
02:42 figure shows, we have got deep samples in the nearshore. Well,
02:42 there are no deep samples in the nearshore. So that was

pointed out by -- by your colleague there.

Q. That -- I'm sorry. Just one second. For the record --

MS. FIDLER: Objection, Your Honor. He wasn't finished answering the question.

MS. KARIS: Your Honor, I was just going to point to --

THE COURT: Well, why don't you let him finish answering first --

MS. KARIS: Sure.

THE COURT: -- and then you can do that. Okay?

MS. KARIS: Sure.

BY MS. KARIS:

Q. Go ahead.

A. So as I just stated, there were no nearshore samples. So that indicated that we had had sample data and location data mismatched. And that's true, we did.

So in the Round 3 report, an error -- a correction, I should say, we've corrected the data. That didn't change the number of samples, it didn't change the number of toxic samples we found; but it certainly changed the location where they belonged. So these deep samples obviously belong offshore, which is where we put them. So it just changed the categorizing or the sorting.

Q. Who was doing the analysis of this data?

A. My colleague, Mark Carls, was, that I've worked with since

approximately 1980, about 30 years or so.
Q. All right. And we'll come back to Mr. Carls -- Dr. Carls. You've published with him, including in some of the peer-reviewed literature that you rely on for your opinions in this case; correct?
A. I have published a number of papers with him, yes.
Q. And was -- I'm sorry. Was it -- is it Dr. Carls who identified on your graph here a deep nearshore?
A. Correct, he did that.
Q. There is no such thing, as you pointed out, as a deep nearshore?
A. Right. That's --
Q. Because -- I'm sorry. One second.

Because here it says --

A. Yeah, because we had the mismatching location and depth that I just described.
Q. Okay. Now, if -- so that's one mistake. Then we had the mismatching that you identified.

If we can now go to TREX-13332.36.1.

And, again, now this is from your Round 3 report after you made some corrections; correct?
A. Between Round 2 and 3, we had about a thousand samples that we couldn't account for. I don't remember the precise number. They match up with Dr. Shea's. So we found those, they were resorted, and we produced this graphic for Round 3,

02:44 which is the errors -- the depth location errors were
02:44 mischaracterized.
02:44 **Q.** Okay. So you found some mistakes and you corrected those
02:44 mistakes in Round 3, but you still have deep nearshore here;
02:44 correct?
02:44 **A.** In Round 3, we still had not corrected, at this time, the
02:45 deep nearshore corrections. That wasn't found between Round 2
02:45 and 3.
02:45 **Q.** Now --
02:45 **A.** It's a thousand samples that we had done -- couldn't find
02:45 that were buried in that 18,000, two-and-a-half-million-record
02:45 database.
02:45 **Q.** Okay. Now, here, May -- first of all, these numbers under
02:45 here, what do they indicate?
02:45 **A.** They indicate the number of samples. And, obviously, it's
02:45 hard to have two bars with a sample of one. So, again, this is
02:45 part of the mismatching and error corrections that we didn't
02:45 catch in time.
02:45 **Q.** Okay. So for May here, you have one sample, but you have
02:45 that one sample with two bars being a -- an intermediate
02:45 nearshore and then another for surface nearshore with different
02:45 readings for one sample; correct?
02:45 **A.** Correct. This is an error and we admit we made an error
02:45 in that report and they've been corrected.
02:46 **Q.** Dr. Rice, you did not perform any of the analyses yourself

of the water chemistry data in your Rounds 2 or 3 reports; correct?

A. It's true that I did not have the capacity, the skill level to handle a sample set that has two and a half million records in it. So, no, I did not do that. I was asking the querying questions, but I did not ask the -- I could not manipulate this database. It's beyond my skill level.

Q. And you relied on Dr. Carls in performing that analysis and then forming your opinions in this case; correct?

A. That's correct.

Q. Now, we talked about the water sediment samples that were reviewed and reported in your Round 2 and Round 3 report. But your Round 3 report also contained an appendix that identified the studies that you contend corroborate your opinions in this case; correct?

A. Correct.

Q. And that's the peer-reviewed literature that you told us you looked at and relied on in reaching your opinions here; correct?

A. Correct.

Q. And I believe you testified on direct very early on that even with Appendix C, you identified some errors and you corrected those errors in December of this year; correct?

A. Correct. There was one paper, a paper by Incardona where we had misidentified two species, one was the bluefin tuna. We

had identified the target species, so to speak, the Gulf species when, in fact, he had done the work on a southern bluefin tuna because that is the -- is the specific bluefin tuna that was being cultured, and he had access to the embryos.

Q. Okay.

A. And we --

Q. So we're going to talk about the Incardona study at length, I think, hopefully not too long. But Incardona studies three species; correct?

A. Three species, the bluefin tuna, the southern -- excuse me. Yeah, the southern bluefin tuna, also the yellowfin tuna, which is a Gulf species, and the amberjack. And he was using a cultured amberjack, very closely related, but it wasn't the Gulf species.

Q. And you misidentified in your report two of those three species; correct?

A. Right. I got the genre right; I didn't get the species quite right.

Q. Okay. And there was some significant differences between the species as you identified them and the species that Dr. Incardona actually studied; correct?

A. Well, let's take the case of the bluefin tuna. The bluefin -- the two bluefin tunas, they both have the same common name. That's because they are very, very similar; similar in morphology, similar in their embryology, similar in

their value.
Q. All right.
A. It's been argued that they're actually the same species and that they're truly -- actually a subspecies of each other. But that's where the literature is right now.
Q. Well, the species that Incardona -- Dr. Incardona identified was which bluefin tuna?
A. He did his work on the southern bluefin tuna, which is in Australia and being cultured there --
Q. Thank you.
A. -- which gave him access to the embryos.
Q. And the Atlantic bluefin tuna which you had identified as the species, that was not studied by Dr. Incardona; correct?
A. That is correct.
Q. And you said there are similarities. But to be clear, the southern bluefin tuna does not live in the Gulf of Mexico; correct?
A. That's correct. It lives near Australia.
Q. So the species that Dr. Incardona actually studied is not found in the Gulf of Mexico with respect to tuna; correct?
A. No, he did not. He studied the bluefin tuna, which is very, very closely related to the Atlantic bluefin tuna.
Q. You've said that a couple of times. And you would agree with me that you recognize that there are different -- strike that.

02:50 You recognize that different species can respond differently to the same chemicals in the same dose; correct?
02:50 **A.** Within a range, that's true. If I conducted a test ten times in a row with one species, I would expect to get very similar results, not identical. But the same would also be true if I tested ten different species that are very similar; I obviously wouldn't get the same results.
02:51 **Q.** But different species -- that is, the Atlantic bluefin tuna -- can have different responses to the same exposure of the same chemicals in the same dose than the southern bluefin tuna; correct?
02:51 **A.** Well, I would expect that the responses would be identical. The dose level might be slightly different, but when we look at a wide range of species -- and I mentioned this in my direct, pink salmon which, of course, is very, very --
02:51 **Q.** We're talking about bluefin tuna --
02:51 **MS. FIDLER:** Objection, Your Honor. He wasn't finished answering.
02:51 **THE WITNESS:** I was demonstrating a point --
02:51 **THE COURT:** Go ahead.
02:51 **THE WITNESS:** I was demonstrating the point that when you have very divergent species, you still get the same effect. The dose level -- you're right, the dose level could be somewhat different, particularly if they are a different size. These two species are not. I'm talking about the embryo.

But, yeah, your point is made. You can have a quantitative response that is different than when the doses --

BY MS. KARIS:

Q. The dose level is significant in analyzing toxicity; correct?

A. Well, certainly the dose matters.

Q. Thank you.

And so if the dose level can be different, you would want to know how a particular species responds to a particular dose; correct?

A. Correct.

Q. Thank you.

Now, you made no attempt to compare the hardiness of the Gulf of Mexico tuna -- that is, the Atlantic tuna -- with the southern bluefin tuna that Dr. Incardona used in his experiment; correct?

A. Correct.

Q. You do not know the specific PAH concentrations that would cause a toxicological response to the bluefin tuna species, which is the species that actually lives -- I'm sorry, which is the species that actually lives in the Gulf of Mexico; correct -- I mean, lives in Australia, it doesn't live in the Gulf of Mexico; correct?

A. You confused me there. Could you --

Q. I'm sorry.

02:53 **A.** -- start one more time?
02:53 **Q.** That was a very poorly worded question.
02:53 You agree that you don't know the specific
02:53 PAH concentration that would cause a toxicological response to
02:53 the Atlantic bluefin tuna embryos, those in the Gulf of Mexico?
02:53 **A.** That's correct, I do not know the precise dose that would
02:53 cause the same threshold effect. I would expect it to be near
02:53 that just because of the similarity of these two species,
02:53 similarity in size.
02:53 **Q.** Wait. Do you recall when we asked you at your deposition
02:53 whether you knew at what concentration -- at what
02:53 PAH concentrations -- what PAH concentrations would cause
02:53 specific toxicological responses to the Atlantic bluefin tuna,
02:53 and you said you did not know?
02:53 **A.** That's correct, I did not know the precise amount. But I
02:53 can have a pretty good educated guess -- a pretty good educated
02:53 estimate, I should say, that the dose would be down there near
02:54 a part per billion. Maybe a little bit above, maybe a little
02:54 bit below, but it's going to be in that range.
02:54 **Q.** In the range, but you don't know precisely?
02:54 **A.** That's correct.
02:54 **Q.** Okay. Now, Dr. Incardona's study that you relied on,
02:54 you're aware that 40 percent of the Australian bluefin tuna
02:54 that he used as controls, meaning no exposure to oil, died
02:54 during the experiment?

02:54 **A.** I'm aware of that.
02:54 **Q.** The rate of mortality for control species -- that rate of mortality for control species is not common in your experience; correct?
02:54 **A.** Correct, it's not common. It's -- I've approached it at times. It's also not common to have 100 percent survival of embryos and larva. I don't know that I've ever seen a test with 100 percent survival of the controls. Embryos and larva are very, very fragile, very, very sensitive, very, very difficult to work with.
02:54 **Q.** I appreciate that you may not have 100 percent controls, but you would agree with me that a 40 percent mortality rate is not common; correct?
02:55 **A.** It is not common.
02:55 **Q.** Thank you.
02:55 And you have never published the results of any toxicological experiment that had a mortality rate of 40 percent for control?
02:55 **A.** I published one paper, I believe, that has near that, over 30 percent.
02:55 **Q.** My question was whether you've ever published anything that had a mortality rate of 40 percent for controls?
02:55 **A.** No.
02:55 **Q.** You agree that Dr. Incardona's study admittedly had complications or, to use your words, it was not perfect -- it

was not a perfect test; correct?
A. That's correct. Very seldom do you get a perfect test with embryos and larva.
Q. Let's look at Dr. Incardona's study. I'm sorry. If we can pull up from the demonstrative that you were shown on direct examination with the control, D-32618-A.

You were shown this demonstrative on direct examination. Do you recall that?
A. Very definitely.
Q. And to be clear, this comes from the publication that you relied on to reach a conclusion that there might be threshold effects at .3 parts per billion; correct?
A. That's correct.
Q. And parts per billion of .2, that would be the dose exposure?
A. It's -- it's the calculated exposure that he has. He has a range of doses, and you calculate out basically where the effect begins based on the calculations.
Q. Now, this call-out from Dr. Incardona's study, to be clear, these oil-exposed bluefin tuna, yellowfin tuna, and yellowtail amberjack species that are shown here, none of these were at that .3 level that resulted in this graphic; correct?
A. To get the spinal effects, they're probably slightly higher, yes.
Q. And when you say "slightly higher," to be clear, the

02:57 Incardona study indicates that -- sorry. For --
02:58 **MS. KARIS:** I'm sorry. Do we have the actual
02:58 document? We can do this.
02:58 **BY MS. KARIS:**
02:58 **Q.** For the bluefin tuna, this is an exposure of 8.5 --
02:58 **A.** That's correct.
02:58 **Q.** -- correct?
02:58 That's right?
02:58 **A.** I believe that's correct. I know it's above 1.
02:58 **Q.** And the exposure for the yellowfin here is 3.4, correct,
02:58 parts per billion?
02:58 **A.** I believe that's correct.
02:58 **Q.** And the exposure here for the amberjack is 13.8 parts per
02:58 billion; correct?
02:58 **A.** I believe that's correct.
02:58 **Q.** So none of the oil-exposed specimens on this diagram from
02:58 which you conclude threshold effects of .3 actually were at .3.
02:59 Instead they were at 8.5, 3.4, and 13.8 parts per billion;
02:59 correct?
02:59 **A.** Correct. What Dr. Incardona is reporting, he reported a
02:59 threshold concentration of .3 parts per billion for the bluefin
02:59 tuna was causing effects. The examples here are -- yes, they
02:59 are severely deformed embryos.
02:59 **Q.** The video that you ran and showed us, the slowed heart
02:59 rate.

02:59 **A.** Yes.
02:59 **Q.** Those were not at the .3 part per billion dosage rate; correct?
02:59 **A.** I'm not sure what dose they were. I suspect they were higher, like you say.
02:59 The threshold effect was for edema, which is beginning to indicate that you're going to get heart rate differences, that's correct.
02:59 **Q.** I want to make sure that we have no confusion because you played a video that showed heart effects and then you told us about threshold levels of .3. The video that you were showing us were at exposure levels above the EPA benchmark level of 1; correct?
03:00 **A.** I'm not sure about above the benchmark. I haven't converted all of his doses into that format.
03:00 **Q.** You don't know whether they were above or below; correct?
03:00 **A.** I know that the .3 is substantially below the benchmark of 1, but I do not know the other doses.
03:00 **Q.** Okay. You do not know whether the exposure -- the dosage for the video that you showed us was for above or below the EPA dosage benchmark; correct?
03:00 **A.** It wasn't part of my purpose to convert all of his doses into TUs. No, I don't know the --
03:00 **Q.** Okay.
03:00 **A.** -- specific TU there.

03:00 **Q.** Now, if we can now pull up TREX-13332-E.19.2.

03:01 And, Dr. Rice, you recognize this. This is from your appendix that you attached to your report that you contended was the peer-reviewed literature that supported your opinions in this case; correct?

03:01 **A.** This is Appendix C, I take it?

03:01 **Q.** Yes. Do you recognize it?

03:01 **A.** Yes.

03:01 **Q.** The top one, the top entry that you contend supports -- excuse me -- a threshold effect at .3, that's this Incardona study that we've been referring to; correct?

03:01 **A.** Correct.

03:01 **Q.** And what is reported here -- and, again, this is for southern bluefin tuna that live in Australia, not the Gulf of Mexico; correct?

03:01 **A.** Same genus, yes.

03:01 **Q.** Okay. And the response that's reported here is edema; correct?

03:02 **A.** Yes.

03:02 **Q.** Now, you're aware that the Incardona study does not report the severity of the edema that he or his colleagues observed; correct?

03:02 **A.** Correct. He didn't grade them out, so to speak, yes.

03:02 **Q.** And you agree that you can have different severities of edema ranging from mild to severe; correct?

03:02 **A.** Sure.
03:02 **Q.** And the consequences are different for edema depending on where you fall on that range or spectrum, mild to severe; correct?
03:02 **A.** I would assume that on the short term that that's probably true, you can get a range of effects.
03:02 **Q.** But you don't know the severity of this edema and what the ultimate effects were; correct?
03:02 **A.** I do not. You're asking for a very detailed level of --
03:02 **Q.** I'm asking because you relied on Dr. Incardona's study; and if you don't know, that's okay.
03:03 **A.** Okay. Thank you.
03:03 **Q.** Now, roughly half of the studies in your Appendix C that you report demonstrated a threshold injury level of .3 -- I'm sorry. Strike that.

Roughly half of the studies in this Appendix C that you reported demonstrated toxicity at a threshold below 10 micrograms per liter are reporting edema or cardio effects; correct?

03:03 **A.** Correct. Somewhere in there I believe I note --
03:03 **Q.** You're not aware of a single study, other than those that you've listed in Appendix C, that demonstrate edema or cardio effects at early stage fishes in concentrations of less than 10 micrograms per liter or parts per billion; correct?
03:03 **A.** I don't understand your question.

03:03 **Q.** Other than what's on Appendix C, you're not aware of any other literature that demonstrates effects?
03:03 **A.** There could be others. I --
03:04 **Q.** Sitting here now, you're not aware of any others?
03:04 **A.** I believe that there's a Higgins study out there. There may be others. I'm not sure.
03:04 **Q.** Did you list the Higgins study in your Appendix C?
03:04 **A.** I don't believe -- I don't believe we did.
03:04 **Q.** Okay. We'll talk about the Higgins study. Other than the Higgins study, are you aware of any others?
03:04 **A.** No. This wasn't meant to be exhaustive. It's -- it's meant to be an example.
03:04 **Q.** It's an example of peer-reviewed literature that you contended supported your opinions in this case; correct?
03:04 **A.** Correct. It wasn't meant to be exhaustive. It was -- we were really targeting the *Deepwater Horizon* studies. These are just gathered in order to be supportive of that -- that they were not unique, for example.
03:04 **Q.** You would agree with me that all of the studies on Appendix C that you contend show cardio toxicity or edema at exposure levels below 10 micrograms per liter were conducted by Dr. Incardona either as the primary or contributing author; correct?
03:05 **A.** Well, what you're assuming there is a lot of these studies were done in previous years when we -- well, Incardona didn't

come along until -- I don't know what year -- approximately the year 2000, sometime in there. So the advances that he's made in embryo toxicity studies weren't known to us prior to that date. I don't know exactly what date. The late '90s maybe, sometime in there.

So we didn't always look -- look for those sorts of effects. When we were doing the pink salmon experiments, we weren't looking for heart defects, for example. We were looking for spinal deformities, jaw deformities, for example, edema maybe, if they were obvious. But we weren't always looking for the intensity, the details that he was looking for.

Q. All the peer-reviewed literature that exists that you're aware -- aware of that shows edema or cardio effects below 10 parts per billion have as the primary or contributing author Dr. Incardona; correct?

A. I'm not sure. I'd have to relook at all of these and get the list out and --

Q. We can move on.

If you were aware of it, you would have listed it in your support -- supporting materials; correct?

A. If they came to mind, yeah. This wasn't a focus area for us.

Q. Now, Dr. Incardona, in this study that resulted in this 2014 publication, do you know where he got the data that he was analyzing?

03:06 **A.** I'm not sure what data you're talking about. What data?
03:06 **Q.** Well, what data did Dr. Incardona analyze to reach his
03:07 conclusions about possibly having edema at a threshold of
03:07 .3 parts per billion?
03:07 **A.** You mean -- well, he analyzed the samples. He analyzed
03:07 the biology and --
03:07 **Q.** Where did he get those samples?
03:07 **A.** What samples are you talking about?
03:07 **Q.** The samples that Dr. Incardona analyzed.
03:07 **A.** Are you talking biological samples, or are you talking
03:07 chemical samples?
03:07 **Q.** The chemical samples.
03:07 **A.** He got those out of his bioassays, out of the stocks --
03:07 **Q.** Where did -- do you know, Dr. Rice, where Dr. Incardona
03:07 got the water samples that he used in order to conduct the
03:07 studies that resulted in this publication?
03:07 **A.** Well, he mixed the -- at site where the exposures are
03:07 taking place, he mixed the oil and the solution using the HEWAF
03:07 method. Is that your question?
03:08 **Q.** No. My question, I guess, is: Do you know whether
03:08 Dr. Incardona used any of the NRD, the Natural Resource Damage
03:08 Assessment data in order to conduct -- excuse me, conduct his
03:08 analysis here?
03:08 **A.** Well, he didn't use them to conduct the tests. That's
03:08 where I think I'm being confused by you there. He didn't use

the NRDA database to conduct the test, the biology tests that he was doing. But he did use the NRDA database in order to see if his samples compare.

And if you remember the -- one of the diagrams there, it shows a sample out of -- I don't remember the cruises, they're named by vessels, but he matched the samples of three different cruises.

Q. And do you know whether he got those water samples -- whether those water samples were intended to be representative of samples that were collected from May to June of 2010 that he had obtained through the NRD process?

A. Well, I guess you'd have to ask him. Those -- those data that he's referring to are in that database. And I doubt that he did a -- well, he didn't do a complete analysis of the database, he wouldn't have had the time. But he did find those samples. And I don't know what process or whatever he did.

Q. Did --

A. He certainly wouldn't have done an analysis of the database. That isn't his objective. I mean, he wants to be relevant, environmentally relevant, of course, in both composition and concentration. And this would indicate that he was.

Any detailed analysis of that database, which would have been the job of -- excuse me, which would have been the job of somebody else, presumably, in the NRDA system, to my

knowledge just hasn't come out yet. We haven't seen an in-depth analysis of the -- of the NRDA database by the people that have -- that took the data, that gathered the samples and did the analysis.

Q. Did you, as part of your work --

THE COURT: Why don't you lift that microphone back up.

THE WITNESS: Sorry.

THE COURT: We have people in another room listening, too. Go ahead.

BY MS. KARIS:

Q. Did you, as part your remit in this case, look at any --

A. I didn't hear you.

Q. I'm sorry. Did you, as part of your remit in this case, look at any of the data that has been collected as part of the NRD process; yes or no?

A. I don't quite understand. There's a word there I didn't hear, about the third --

Q. Sure. Let me ask it again.

THE COURT: I didn't hear -- I didn't understand it. Did you say "remit"?

MS. KARIS: Remit.

BY MS. KARIS:

Q. As part of the work that you did in this case.

THE COURT: Okay.

03:10 **BY MS. KARIS:**
03:10 **Q.** Let me rephrase it.
03:10 **A.** I don't quite know what you mean by "remit." That's --
03:10 **Q.** I apologize. I will withdraw it.
03:10 **THE COURT:** I don't either.
03:10 **THE WITNESS:** Oh, good.
03:10 **BY MS. KARIS:**
03:10 **Q.** As part of the instructions you were given in this case to render opinions about potential and actual harm to the environment, did you consult any data that was collected as part of the NRD process?
03:11 **A.** I guess the NRDA database that we're talking about, we were given access to the data, but we were not given access to the people that took the data. We were not given access to any of the -- any syntheses or anything out of that. We were just given the raw data, 18,000 samples.
03:11 **Q.** And those 18,000 samples, do you know whether that data was collected as part of the NRD process or if there's separate data for that?
03:11 **A.** I -- I really don't know that.
03:11 **Q.** All right. I'll move on.
03:11 You talked about HEWAF.
03:11 **A.** Yes.
03:11 **Q.** HEWAF is the methodology that Dr. Incardona used for his study; correct?

03:11 **A.** That's correct.
03:11 **Q.** And HEWAF uses a commercial food blender to prepare an oil and water mixture that is then tested; correct?
03:12 **A.** Correct.
03:12 **Q.** In your report, you describe HEWAF as a method of using high energy; correct?
03:12 **A.** Correct.
03:12 **Q.** The high-energy blender method that Dr. Incardona used, according to you, is designed to entrain small dispersed droplets into the water; correct?
03:12 **A.** Correct.
03:12 **Q.** And it's supposed to then promote some of the heavier and more toxic compounds into solution; correct?
03:12 **A.** Because of the small droplets of significant quantities, presumably, of the heavy compounds that can then get into the solution, yes.
03:12 **Q.** You have no idea, though, how much energy is generated by the blender that was used in Dr. Incardona's experiment; correct?
03:12 **A.** Correct. And I don't really care. All I want to know is if the composition, the resulting composition that he uses is relevant.
03:13 **Q.** Okay.
03:13 **A.** It's hard to equate -- excuse me. It's hard to equate laboratories -- it's hard to equate laboratory studies with the

environment.

Q. Do you need some water?

A. Yes, I do. Give me about two seconds. Thank you.

It's hard to equate laboratory studies, laboratory energy and mixing methods. You can't mimic the environment precisely, or maybe even crudely, for that matter. But what you can do is mix up compositions and concentrations that have some sort of environmental relevance, and that was the goal here. That's the goal of these things.

Q. All right. All right. I'm sorry. So just to be clear -- if I get an answer with the coughing, I apologize.

So you do not know how much energy was generated, though, by using the blender method; correct?

A. That's correct, I do not.

Q. And you don't know whether the energy that was at the surface is similar to the energy in the blender that Dr. Incardona used; correct?

A. I have no idea. That's correct.

Q. Dr. Incardona's paper references 78 samples; do you recall that?

A. Actually, I do not.

Q. Okay. If we can pull up your deposition at 211, lines 15 to 19, to see if this helps refresh your recollection. Actually, we have the Incardona study as well.

Do you recall when you were asked:

"QUESTION: Do you know where in the Gulf of Mexico the 78 samples were collected from that Dr. Incardona utilized in his re-publication?"

And you say you have no idea?

A. And I still have no idea.

Q. Okay. So I believe you were speaking to where from the Gulf of Mexico those samples were. You said you had no idea. And it's your testimony today you don't even have an idea as to how many samples there were; correct?

A. Well -- correct. I -- no, I do not know -- I don't know the process he used to get, quote, the 78, when there's 18,000, you know. I don't know what he used.

Q. Okay. So just to wrap up on this piece, Dr. Rice, you're relying on Dr. Incardona's study. You do not know how many samples he used, where those samples came from, what process he used or how much energy was generated by the HEWAF blender that he used; correct?

MS. FIDLER: Objection, Your Honor. This is a compound question, of which most of it has been asked and answered.

MS. KARIS: I'm happy to do it one piece at a time. If it's in the record, I'm happy to move on.

THE COURT: Well, it sounds like -- it sounds like you're just asking him to confirm what he's already said. Piece by piece, you're trying to throw it all together, so --

03:16 **MS. KARIS:** I was trying to summarize.
03:16 **THE COURT:** I'll sustain the objection. Okay.
03:16 **BY MS. KARIS:**
03:16 **Q.** Dr. Rice, you would agree with me that you were missing several pieces of information with respect to Dr. Incardona's study; correct?
03:16 **A.** Well, for a detailed, precise evaluation, I suppose you're correct. I was relying that this is, one, a peer-reviewed publication. I could tell in my own review that it was a high-quality publication, I believe. Will it answer all of your environmental questions? I guess not.
03:16 **Q.** Okay. Now, we were talking about HEWAF and its reliability. And I believe you said there is no standard method; correct?
03:16 **A.** Not in --
03:16 **Q.** For conducting testing?
03:17 **A.** That's correct. I said that. And what I meant was in environmental and damage assessment-type studies, like this was, bioassays, no, there is no standard that is required.
03:17 **Q.** Dr. Incardona relied on HEWAF; correct?
03:17 **A.** Uh-huh. That's correct.
03:17 **Q.** And you're not aware of a single instance in which the EPA has relied on the HEWAF methodology; correct?
03:17 **A.** I am not, but HEWAF -- excuse me. But EPA does not do damage assessment studies. This is more in the purview of

NOAA, and they're going to study site-specific, species-specific-type studies, and that's what they're doing relative to the Gulf.

Q. The EPA, in conducting any and all of its toxicological testing --

A. Which are not site-specific damage assessment studies.

Q. They do not use HEWAF; correct?

A. I don't believe they do. They do -- they do have a CEWAF standard method, I believe. I'm not 100 percent sure of that. But I think they have CEWAF in there.

Q. Would you agree with me that it is important to understand what -- strike that.

When conducting toxicity experiments using HEWAF, you need the analytical chemistry measurements for each exposure; correct?

A. Do you need them all? No. Are they all ideal? Yes.

Q. And you agree that it's important to understand what the concentration and compositions are and how they change over time?

A. It's very, very desirable, yes.

Q. You mentioned CEWAF. Do you know whether that is used for dispersants?

A. Correct. That's chemical enhanced. That's what the C is for, chemical enhanced, short for dispersants.

Q. Now, Dr. Incardona's study that used HEWAF, you understand

that all of the samples other than the highest concentrations and the controls for bluefin tuna were lost in transit from Australia to the United States; correct?

A. That's correct. That's part of the imperfectness of this study.

Q. As a consequence, the only analytical chemistry from Dr. Incardona's study for his bluefin tuna experiment was the chemistry data for the highest initial PAH concentrations; correct?

A. That's correct, as I understand it, anyway.

Q. For all other concentrations, Dr. Incardona was unable to conduct analytical chemistry; correct?

A. Right. He operated under the principles of dilution.

Q. He had to estimate the PAH concentrations and compositions; correct?

A. He had -- correct. He did that because he knew what the dilutions of the stock were, of course.

Q. But he estimated because he had lost the samples; correct?

A. I'd say he measured it, he just didn't measure it chemically, which would be the ideal, preferred way. I mean, he measured the dilutions, so they're not estimated, they're measured.

Q. Would that be another missing piece of information from Dr. Incardona's study?

A. Well, yes. But the other two species did not have this

sort of problem.
Q. You testified that Dr. Shea thought that the Incardona study was seriously flawed, if I heard your words correctly.
A. I don't remember saying seriously flawed. I know he criticized them for not being standard.
Q. And do you know whether some of the criticisms that Dr. Shea has is because of all of the missing information from the Incardona study, including some of which we've talked about here today?
A. I think you should ask that question of Dr. Shea, not me.
Q. Okay. And we will.

Let's talk now about the Carls and Heintz publications that you rely on as part of the -- part of the peer-reviewed literatures that you contend supports your opinions.

MS. KARIS: TREX-13332-E.1.9, please. Can we bring that up.

BY MS. KARIS:

Q. And, again, this is the second species identified in your Appendix C that you contend supports your opinions about .3 being a threshold where there might be sufficient exposure for harm; correct?
A. Correct, I think.
Q. And this is -- the author here is Dr. Carls; correct?
A. He's the lead author, yes.

03:21 **Q.** And that's Mark Carls --
03:21 **A.** Correct.
03:21 **Q.** -- who assisted you in this case; correct?
03:21 **A.** Yes.
03:21 **Q.** You're a coauthor on this paper?
03:21 **A.** If I remember exactly, yes.
03:21 **Q.** And this is studying Pacific herring; correct?
03:21 **A.** That's correct.
03:21 **Q.** And, again, Pacific herring do not live in the Gulf of Mexico, do they?
03:22 **A.** No, they do not.
03:22 **Q.** And the method used here is ORC?
03:22 **A.** Right.
03:22 **Q.** That's oil, gravel, and column method; correct?
03:22 **A.** Well, the R stands for rock; but you're right, it's gravel, small -- small gravel.
03:22 **Q.** Okay. Oil, rock?
03:22 **A.** Yeah.
03:22 **Q.** Okay.
03:22 **A.** Same thing.
03:22 **Q.** All right. And that is not a widely used method, is it?
03:22 **A.** No, it is not.
03:22 **Q.** And you're not contending that the ORC method represents conditions in the Gulf of Mexico, are you?
03:22 **A.** No, I'm not. We designed that in order to mimic the

03:22 conditions we were seeing in Prince William Sound following the *Exxon Valdez* spill.
Q. Now, this publication has been the subject of some peer-reviewed literature criticism; correct?
A. That's correct.
MS. KARIS: Let's pull up TREX-13336.1.1.
BY MS. KARIS:
Q. You recognize this document; correct, by Drs. Page -- Dr. Page and others titled prospective article -- "A Perspective on the Toxicity of Low Concentrations of Petroleum-derived Polycyclic Aromatic Hydrocarbons to Early Life Stages of Herring and" sample -- I'm sorry, "Salmon." You're familiar with this document; correct?
A. I am familiar. There's -- these authors have published several criticisms of these papers.
Q. Okay. And what they're criticizing is the document or the publication that you list in your Appendix C, the second item there that we were just looking at; correct?
A. That's correct.
Q. Okay. If we can look at 13336.2.1.
And what they say is, "We have reviewed all available information pertaining to the toxicity studies of Heintz and Carls, et. al., as well as related studies."
Correct?
A. That's what it reads.

03:23 **Q.** Okay.

03:23 **MS. KARIS:** If we can now go to 13336.1.2, please.

03:24 **BY MS. KARIS:**

03:24 **Q.** It says: "Based on a review of the evidence from published project reports, peer-reviewed publications, chemistry data and public database, and unpublished reports and laboratory records, the reviewed studies did not establish consistent dose (concentration) response or causality and thus do not demonstrate that dissolved PAH alone from the weathered oil resulted in the claimed effects of the fish embryo at low microgram-per-liter" rates -- correct, "concentrations."

Correct?

03:24 **A.** That's how it reads.

03:24 **Q.** And what they go on to conclude is the study should not be relied on when assessing the risk of low PAH exposures to early life stages of fish; correct?

We can pull it up, but do you recall if that's what they conclude?

03:24 **A.** I can read it, and you read it accurately.

03:25 **MS. KARIS:** And if we can now go to TREX-13336.25.1, please.

03:25 **BY MS. KARIS:**

03:25 **Q.** In their conclusion, what they stated --

03:25 **A.** Is this the same paper?

03:25 **Q.** It is.

03:25 **A.** Okay.
03:25 **Q.** "The conclusions of Heintz and Carls that weathered oil is more toxic than unweathered oil and that such toxicity occurs at about 1 microgram per liter dissolved TPAH are not supported by the data, based on our analysis of their published and unpublished data."
03:25 That was their conclusion; correct?
03:25 **A.** At least part. You read that accurately.
03:25 **Q.** And you included this Heintz publication in your Appendix C as supportive of your opinions; correct?
03:26 **A.** That's correct.
03:26 **Q.** And you also included Carls, the Carls publication as supportive of your opinions; correct?
03:26 **A.** The papers on pink salmon and Heintz's work and Carls' works on the -- mostly on the herring.
03:26 **Q.** Appendix C, which contained all the peer-reviewed literature that you contended supported your opinions, also referenced Dr. Incardona's study with respect to yellowfin tuna and amberjack; correct?
03:26 **A.** Yes.
03:26 **MS. KARIS:** Okay. If we can now look at TREX-13332-E.20.1.
03:26 **BY MS. KARIS:**
03:26 **Q.** Again, using the HEWAF method -- and this is at concentrations of 1.0 to 2.6 micrograms per liter -- what they

conclude is that the response for yellowfin tuna is heart rate -- is it bradycardia threshold?

A. Correct. That's slowing of the heart rate. Bradycardia is slow.

Q. Okay. Now, nowhere in the Incardona study do the authors provide any data of actual impacts to the yellowfin tuna population; correct?

A. Not to the population. This is a laboratory bioassay to demonstrate mechanism.

Q. The next entry, .2.0, 13332-E.2.0, this is an example of one of the corrections that you made to your Round 3 report; correct?

A. Correct. I had gotten the genus correct, but I'd mislabeled -- misidentified the species.

Q. Okay.

A. I had the wrong one.

Q. All right. And it's yellowtail amberjack, not greater amberjack, as you had identified it; right?

A. Right.

Q. And again, the yellowtail amberjack that Dr. Incardona is reporting on also does not reside in the Gulf of Mexico; correct?

A. Correct. That's an Australian species that are being cultured. So he had access to the embryos. The greater amberjack would be the one we would really prefer. It was not

cultured, so he didn't have access to the embryos.
Q. You would agree with me, Dr. Rice, that you do not know if there are differences in reactions to exposure between greater amberjack that you listed in your original report and yellowtail amberjack that Dr. Incardona actually studied; correct?
A. That's correct. I would expect them to be in the low similar range, low parts per billion. But if one's a little bit higher than the other, or a little bit lower, you're correct, I don't know the precise differences between the species of -- response of the two species.
Q. You've previously told us that you are not an expert in species, on different species and differences between species; correct?
A. Well, what I said was I'm not obviously a taxonomist and I'm -- I'm also not from the Gulf Coast. So, yeah, the common names and getting the genus species right, obviously I'm not a very good expert at that, am I?
Q. I think what you said is "they all look the same to me"; correct?
A. I don't remember saying that. But I don't know what any one of them looks like. I'm looking at the data. I don't go out there and fish for either species. I've never caught an amberjack or a yellowfin or a tuna or whatever, so I have no idea what they look like.

03:29 **THE COURT:** Ms. Karis, do you have -- how much more do you have? I'm trying to decide if we should break now or what.

03:29 **MS. KARIS:** Well, Your Honor, I probably have a good 20 minutes.

03:29 **THE COURT:** All right. Let's take about a 15-minute recess.

03:30 **MS. KARIS:** Thank you.

03:30 **THE DEPUTY CLERK:** All rise.

03:30 (WHEREUPON, the Court took a recess.)

03:32 **THE DEPUTY CLERK:** All rise.

03:47 **THE COURT:** Please be seated, everyone.

All right. Ms. Karis, you may resume.

03:47 **MS. KARIS:** Thank you, Your Honor.

And just for the record, we're continuing the cross-examination of -- Hariklia Karis continuing the cross-examination of Dr. Rice.

03:47 **BY MS. KARIS:**

03:47 **Q.** Dr. Rice, we were speaking before the break about some of the studies and the species that you listed on Appendix A. If we can now pull up one -- I'm sorry, Appendix C of your report.

03:47 **MS. KARIS:** If we can pull up TREX-13332E.19.8, please.

03:47 **BY MS. KARIS:**

03:47 **Q.** Here again, we have Atlantic cod as one of the species

that you're relying on in support of your opinions in this case; is that correct?

A. That's correct.

Q. And again, Atlantic cod, that's not a Gulf of Mexico species, is it?

A. No. No, it is not.

MS. KARIS: Next, TREX-013332.F -- I'm sorry, E.20.4, please.

BY MS. KARIS:

Q. Here are a couple of other species that you list in your report, and you referenced this Mager publication -- Mager, excuse me, publication, in support of your opinions in this case and you discussed it during your direct examination. Do you recall that?

A. That's correct.

Q. Now, just like Dr. Incardona, the Mager study, which resulted in these concentration levels of 1.2 micrograms per liter, that relied on the HEWAF methodology; correct?

A. That's correct. Incardona is a coauthor with Mager in that paper.

Q. And that was going to be my next question, which is: This paper, again, is a Dr. Incardona coauthored publication that relies on this HEWAF method; correct?

A. Correct.

Q. You're aware that Dr. Mager's results, likewise, have not

been reproduced by any other scientists; correct?
A. Well, they have not been attempted with this species. Let's phrase it that way.
Q. Using the same species, Dr. Mager's results have not been reproduced by any other scientists; is that correct?
A. Well, that is true; but a lot of studies have not been replicated in that fashion.
Q. And, similarly, Dr. Incardona's study has not been replicated using the exact same species; correct?
A. Correct. To my knowledge, nobody's even attempted it.
MS. KARIS: If we can pull up TREX-13338.1.1, please.
BY MS. KARIS:
Q. You recognize this is the Mager study, "Acute Embryotic or Juvenile Exposure to *Deepwater Horizon* Crude Oil Impairs the Swimming Performance of Mahi-Mahi." Correct?
A. Correct.
MS. KARIS: If we can now go to .6.1.
BY MS. KARIS:
Q. It states in the Mager study that "Although direct measurements of cardiac performance were not made, the lack of an effect on" -- is it acrobic --
A. Aerobic.
Q. -- "acrobic scope" --
A. That's an "E".
Q. -- "strongly indicates that cardiac output was

maintained."

Correct?

A. That's what it says.

Q. Nowhere in your expert report do you state that cardiac function was maintained for this Mager study even though you list it as supporting your opinions for causing impairment; correct?

A. Correct. The important point here was the swimming performance, which is really the net effect -- net result, rather, of first supposing the embryos and then growing them out and looking at what their functional performance was and these guys have reduced swimming performance.

And swimming performance is really a function of the animal's ability, including aerobic scope, as you put here, but also was there any damage to the muscle or any other infrastructure issues, and we don't really know.

We just know that the net result here is that the swimming point was -- the swimming performance was reduced, even though we don't know the specific reasons.

It's quite possible, for example, that the heart was impacted -- probably was -- had edema, for example, in those embryos, and yet the heart recovered in function, and yet some downstream damage in these tissues, probably, and muscles occurred, but you really don't know.

Q. We don't know --

03:52 **A.** All you now is the net result is that these exposed animals still had a swimming performing issue 30 days after the exposure.

THE COURT: Before you ask your next questions, I want to -- the two words up there, the "acrobic," is the second word "aerobic"?

THE WITNESS: No, it's aerobic, A-E-R --

THE COURT: But the first one in the second line is "acrobic" or "aerobic"?

THE WITNESS: It's aerobic, A --

THE COURT: So that's an "E".

THE WITNESS: -- A-E -- it looks like a "C" but that's a printing problem.

THE COURT: So in both -- both the second line and the second to the last line, it's "aerobic"?

THE WITNESS: Correct.

THE COURT: A-E-R --

THE WITNESS: A-E-R.

03:53 **THE COURT:** Okay. That's all I wanted to know. Thank you. Okay.

BY MS. KARIS:

Q. Is it fair to say that we do not know what the ultimate effect of this cardiac study on mahi-mahi from Dr. Mager is?

A. I'm sorry, could you repeat --

Q. I'll withdraw the question. I'll withdraw the question.

03:53 **A.** Well, we know that the swimming performance is affected.
03:53 **Q.** But beyond that, we don't know what the end point effect is; correct?
03:53 **A.** Well, you got to know whether we can surmise, estimate, for example, that because of the swimming performance effect, that the animal's chances of survival in the wild would be reduced, whether it is reduced or they'll reproduce in five years, yeah, you don't know those issues.
03:53 **Q.** Again, to use --
03:53 **A.** It's showing potential.
03:53 **Q.** To use your words, we would be surmising; correct?
03:53 **A.** Yeah, it would be educated surmising.
03:53 **Q.** Let's go to a new subject, population data.
03:53 Is it correct that you are not contending that there has been a shrimp population collapse in the Gulf of Mexico?
03:54 **A.** I don't believe I discussed shrimp whatsoever, so why would you go there?
03:54 **Q.** Any -- would you agree that any hypothesis of a shrimp population collapse would be mere speculation?
03:54 **A.** No, I wouldn't agree with that. What I -- what I'll say is that I have no opinion because I did not study shrimp. I didn't even look at a shrimp effects paper, and I'm certainly not looking at the population. That would have been in Dr. Boesch's realm.
03:54 **Q.** Okay. So you have no opinion regarding any population

effect on any species; is that correct?
A. That would be correct.
Q. Okay. You mentioned coral?
A. In the reports, yes.
Q. Yes, in your Round 1 report.
MS. KARIS: And if we can pull up 13330.29.1, please.
BY MS. KARIS:
Q. Do you recognize this as an excerpt from your expert report?
A. Yes.
Q. And you reference visual damage -- I'm sorry, visual evidence of damage to deep sea coral and brittle stars was detected 11 kilometers southwest from the wellhead, and your support for that is the White publication; is that correct?
A. That's correct.
Q. And then you go on to say later that "Two other communities of corals were found to be impacted by the *Deepwater Horizon* at 6 and 22 kilometers from the wellhead."
And there you reference the Fisher paper; correct?
A. That's correct.
MS. KARIS: Now if we can look at TREX-13195.1.1, please.
BY MS. KARIS:
Q. This is the White publication, the first citation in your opinion; correct?

03:56 **A.** Correct.
03:56 **Q.** And we see here that in that White publication they state, "Healthy coral communities were observed at all sites greater than 20 kilometers from the Macondo well, including seven sites previously visited in September of 2009, where the corals and communities appeared unchanged."
03:56 Correct?
03:56 **A.** That's what it states, yes.
03:56 Then it goes "however" --
03:56 **Q.** And this -- and this is a December 2012 publication; correct?
03:56 **A.** That's correct.
03:56 **Q.** You did no independent evaluation of Dr. White's analysis; correct?
03:56 **A.** That's correct.
03:56 **Q.** And the second paper you referenced was -- had the lead author of Dr. Fisher; correct?
03:57 **A.** That's correct.
03:57 **MS. KARIS:** And now if we can pull up TREX-13196.1.1.
03:57 **BY MS. KARIS:**
03:57 **Q.** And is this the publication from Dr. Fisher that you referenced on your direct examination --
03:57 **A.** I believe --
03:57 **Q.** -- dated August 12th of 2014?
03:57 **A.** I believe it is.

Q. Okay. You -- again, you did not analyze any of the underlying data in the Fisher publication?

A. No, I read the report and reviewed it and . . .

Q. You didn't look at any of the underlying data; correct?

A. That's correct.

MS. KARIS: And if we can now go to .5.3, please -- that's 13196.5.3.

THE WITNESS: Is this the same paper?

BY MS. KARIS:

Q. Do you recognize it as the Fisher publication that you relied on?

A. I --

Q. I'll represent to you this is from the --

A. Okay.

Q. -- Fisher paper that is cited in your expert report --

A. Okay.

Q. -- that we were just looking at.

A. Okay. Thank you.

Q. It states, "Fourteen coral colonies exhibited evidence of recent impact noted by both observers. Most of these had only small areas impacted, either because the corals were quite small or because only small portions of the corals were impacted. Although, six corals showed visible evidence of impact to over 10 percent of the colonies."

Correct?

03:58 **A.** Correct.
03:58 **Q.** That is -- do you know -- do you have an understanding of where these authors were looking for coral colonies; that is, where these colonies were located?
03:58 **A.** I'm not a coral expert; but from the reading of the papers, I knew that they were within, what -- 10 to -- 10 to 20 kilometers of the wellhead and I know they were very, very deep down there at roughly 1300 meters or so, somewhere in that range.
03:58 **Q.** They were located at lease block MC344; correct?
03:59 **A.** That could be, I don't know.
03:59 **Q.** And do you -- have you looked at the water chemistry specifically in and around MC344?
03:59 **A.** No.
03:59 **Q.** Which is where these samples -- where these corals were observed?
03:59 **A.** No. I did note that in the previous paper by White, that Dr. Reddy, who was a chemist, had analyzed and looked very specifically for evidence of oil exposure. He could not fingerprint the PAH, the residue, that oily marine -- he could not fingerprint it to the *Deepwater Horizon*. He then went to the biomarkers, and there was a pretty good suggestive evidence.

In other words, to me that means more likely than not that it was from the Macondo oil, but it wasn't at, say, the

95 percent level.
Q. Now you're talking about the White paper; is that correct?
A. I'm talking about the chemistry that came out of the White paper.
Q. But I was talking about the Fisher --
A. To my knowledge, there's no chemistry that's in this particular paper.
Q. All right. The Fisher paper that you referenced, that was the one we were talking about.
A. Correct.
Q. Those corals that they're discussing came from MC344; correct?
A. Right.
Q. Or from around MC344; correct?
A. I do not know that.
Q. You don't know where they came from. You don't know what the water chemistry in or around that block looked like; correct?
A. There's no water chemistry reported in this paper, no.
Q. And you do know that there was sediment chemistry in the area that Dr. Fisher is talking about in this paper; correct?
A. I do not remember that.
Q. But --
A. In this paper?
Q. Correct.

04:00 **A.** I do not remember that.
04:00 **Q.** You don't remember that he referenced sediment chemistry, and what we know is that you did not review any of the sediment chemistry; correct?
04:00 **A.** I did not -- I did not review any -- I didn't do a complete job. I did not do an exhaustive job. I think I did a pretty good job once it's corrected on the water column but not the sediments. I just didn't get that far.
04:01 **Q.** I was talking about sediment chemistry, Dr. Rice.
04:01 **A.** I was just trying to clarify how much I did on the sediments, and it would be very minimal.
04:01 **Q.** Very minimal on the sediments --
04:01 **A.** I relied on the data that would be reported in these various publications. I didn't go into significant depth on those.
04:01 **Q.** The sediment chemistry that you went into depth on, none of that sediment chemistry was what Dr. Fisher was looking at; correct?
04:01 **A.** You're correct in that.
04:01 **Q.** Thank you.
04:01 **MS. KARIS:** TREX-13275.1.1, please.
04:01 **BY MS. KARIS:**
04:01 **Q.** Do you recognize this Fisher publication?
04:01 **A.** No, I do not.
04:01 **Q.** This is dated September 2014. Since you relied on

Dr. Fisher, did you also look at this publication in support of your work and opinions in this case since you were speaking to damage to corals?

A. I completed the Round 1 report where I went into the corals. I don't recall looking at this paper, to be honest. I may have. I don't remember.

Q. All right.

MS. KARIS: All right. If we can now look at 13275.3.1.

BY MS. KARIS:

Q. Dr. Fisher and his coauthors report in September of 2014, "Furthermore, colonies observed with low levels of flock on their service in 2010" -- surface, excuse me, "in 2010, less than 20 percent coverage, were likely to exhibit apparently complete recovery of the flock-covered branches by March of 2012. "

Were you aware of that finding?

A. I don't recall. But I also see a "however." So I'm not going to opine on this without rereading this paper.

Q. You don't know one way or the other whether that's accurate; correct?

A. I do not.

Q. Sitting here today, do you have any reason to disagree with Dr. Fisher's findings since you relied on his earlier publication in support of your opinions in this case?

04:03 **MS. FIDLER:** Objection, Your Honor. The witness has stated that he would want to see the rest of this paper before offering an opinion on it.

04:03 **MS. KARIS:** I'll withdraw the question, Your Honor.

04:03 **THE COURT:** Okay.

04:03 **BY MS. KARIS:**

04:03 **Q.** You referenced Pacific herring as part of your direct examination.

04:03 **A.** Yes.

04:03 **Q.** And you also referenced Pacific herring in your Round 3 report; correct?

04:03 **A.** Again, I don't remember. I'm sure you'll remind me.

04:03 **Q.** Sure.

04:03 **MS. KARIS:** Let's pull up 13332.16.1, please.

04:04 **BY MS. KARIS:**

04:04 **Q.** Does this remind you that this comes from your expert report? And it's part of your Round 3 report, I'll represent to you.

04:04 **A.** Okay. I -- I recognize the sentences. I've written them several times, actually.

04:04 **Q.** You state here: "Although there have been many years of studies on herring, there is no satisfactory explanation of their crash, whether it was oil related or not."

04:04 Correct?

04:04 **A.** That's correct. That's accurate.

Q. With the information collected during those years, it is not possible to prove that the oil spill caused the crash, nor does that prove that oil was not a contributing factor.

Correct?

A. Correct.

Q. We simply do not know the cause.

Correct?

A. That is correct. It's a disappointment that we don't know one way or the other.

Q. You agree that there have been other serious declines in herring populations in Alaska; correct?

A. Well, here's the -- "serious" is -- that's a word that I can't quantitate. Crash, I can. Certainly populations ebb and flow, they go down, they go up. A few years later they rebound, they go down, they go up.

This particular population crashed. What I mean by that is it fell off the grid -- the cliff. So in one winter, about 75, 80 percent of the standing stock was lost, and that sort of crash is pretty rare. It's just not customary. And usually if a population ebbs and flows, that's because the mortalities exceeds the recruitment level here. Well, here we just have a crash of the standing stock and we don't have a balance between the old guys dropping off and the new guys coming on that ebbs flows, so to speak.

So this population is enigmatic. We just don't know

why.

Q. And we simply don't know why; correct?

A. Simply do not know. We try --

Q. So you're not suggesting or drawing parallels between the Pacific herring crash and any *Deepwater Horizon* potential impact, given that we don't know what happened to the Pacific herring; correct?

A. No, not the crash part. We do know that the 1989 and the 1999 year class is basically missing. We do know that certainly those embryo impacts -- embryo toxicity impacts can occur down there at the low part per billion levels.

So we have a mechanism there from the 1989 year class. Again, we do not know why the crash of the standing stock occurred.

Q. But you're not offering --

A. We desperately tried, by the way. The trustees have spent a lot of money trying to figure out just why they crashed and they were unsuccessful in determining it.

Q. Understanding that there has been an attempt to under -- to figure out why the crash, you're certainly not offering any opinions in this case that --

A. No.

Q. -- there are any similarities; correct?

A. No. No, not with herring.

MS. KARIS: Your Honor, I have no further questions.

Thank you, Dr. Rice.

I've been corrected.

THE COURT: It looks like you have one.

MS. KARIS: With the Court's indulgence.

If we could pull up D-32630-A, please. That's what you get when you ask; right?

D-32630-A.

BY MS. KARIS:

Q. This was a demonstrative you were asked about on direct examination.

And I have a question for you, just trying to understand it, Dr. Rice. You spoke to what the red line indicates, and remind us again what this line indicates.

A. It's hovered right over the 1, so that basically if you had a TU of greater than 1, that would presumably mean that the -- that it's not safe. And if you had TUs less than 1, it would presumably be safe.

But in this particular case, you have the population there -- excuse me -- that group of animals around .8 toxic units that are circled in red, and these are significantly different than the controls.

And the vertical axis here is mortality. So roughly 30 percent of these guys are dying, and the biologists that have done this test have identified that as being significantly different than the controls. And basically you have an impact

at a TU of less than 1.

Q. Is this gray line the LC50 value?

A. It would be, yeah.

MS. KARIS: Thank you. Nothing further.

THE COURT: Redirect?

MS. FIDLER: Your Honor, I have a very short redirect.

THE COURT: By the way, somebody -- Ms. Karis just mentioned an LC50 line. Remind me again what that means.

THE WITNESS: Surely. What it means is that if you're to expose a -- in a series of doses, you calculate the LC50.

This is very handy when you're comparing the toxicity of Toxicant A with Toxicant B with Toxicant C, and that's because the statistics about trying to identify where that 50 percent mark is -- is the best, so you get the best confidence about that number.

So if we were to say Toxicant A is more toxic than -- than Sample B, you would use the LC50. In contrast, what we're doing here is you're trying to find the threshold of effect; what is the dose, for example, that will cause a heart problem or bent spines or something like that.

THE COURT: Well, what does the 50 mean? 50 what?

THE WITNESS: The 50 means 50 percent.

THE COURT: 50 percent of the animals would die,

would be adversely affected? What does it mean?

THE WITNESS: Yeah, if you could go back a slide, I'll just --

THE COURT: Put the slide back up.

THE WITNESS: It will just take me two seconds. I don't know what slide it was. There it is.

So, basically, here you'd look at 50 percent, and where it crosses this -- this line -- and the line isn't drawn. Then where it crosses is right there, and then you'd come down, and basically what it says in this case is that the 50 percent mortality mark is at a TU of about, I'll say, 1.1. Usually we would have that in PAH concentrations. And they'll tell you where they -- where -- where you could expect a 50 percent mortality.

And the point that's used in toxicology, this is the point that is the most accurate to measure. And this is important if you're measuring the -- the difference between different toxicants, like copper or zinc. But --

THE COURT: So in your field, in toxicology, according to this measurement, it only becomes the -- the dosage only becomes relevant if the mortality gets to 50 percent? Am I stating that wrongly? I'm trying to understand what that means.

THE WITNESS: You're not quite there, Your Honor.

If we were looking at copper, a copper solution,

how does that compare -- or a pesticide, Pesticide A and Pesticide B -- and this is really where bioassays evolved. Is Pesticide A more toxic than Pesticide B? Well, we would calculate out the LC50, and it's purely because this statistical calculation is more accurate.

THE COURT: You're comparing the dosages of two different --

THE WITNESS: Two different poisons.

THE COURT: -- chemicals or poisons. And so what dosage of each would get you to your 50 percent mortality level? Is that what you're saying?

THE WITNESS: Right. And that would allow you, then, to say this toxicant is more toxic than the other.

But when we're looking at environmental effects and damage assessment studies, we're not interested in that value. We're interested in what is a safe value, and that's someplace down on the curve here.

So we don't look at LC50s. We're looking at what concentration, for example, will stimulate an effect on the heart, and we want to know what dose will do that. So that then tells us what dose -- what parts per million -- what parts per billion are safe.

And so bioassays evolved in this pesticide concept, but really we don't quite use it that way.

Does that make sense?

THE COURT: Sort of.

REDIRECT EXAMINATION

BY MS. FIDLER:

Q. Let me -- let me try following up on this question.

If you're looking at mortality --

THE COURT: No. Wait, wait, wait. This chart is not saying -- it's not that an LC50 value doesn't mean something's safe?

THE WITNESS: It doesn't mean anything in this chart, Your Honor. It's -- I don't know why it's there. It came out of the -- out of the test. We don't -- we normally don't calculate it --

THE COURT: That's not something that's for your purposes?

THE WITNESS: We don't use it. We're trying to find a dose that is --

THE COURT: Okay.

THE WITNESS: -- harmful versus a dose that's safe.

THE COURT: That's good enough. I understand now.

Okay. Go ahead.

BY MS. FIDLER:

Q. I would like to follow up. What percentage levels -- and this is an example of mortality. So that would be you're looking at an LC, a lethal concentration; correct?

A. Right. And if you notice down here, this is the TUs for

chronic, and here we have mortality, 30 percent mortality. So this is just further evidence that this is not a very safe screening procedure, so to speak.

Q. I'd just like to clarify. What does the term "EC50" mean?

A. EC50 is a -- refers usually to some sublethal concentration. So it's an environmental effective dose. Effective -- what is the effective -- that's the E -- effective concentration that would cause a decrease in growth. That's how EC is used.

And then, again, that's getting at the concept of what doses are protective versus harmful using -- rather than mortality, using a different -- a sublethal end point.

Q. And you mentioned earlier that these -- that what was chosen as significant -- who chose to represent those levels as significant?

A. The people that ran this test for BP, they did this, I suppose.

Q. And what -- I'm sorry.

A. The experimenters.

Q. And so what level does -- do toxicologists currently -- what percentage levels of either effects or mortality are generally deemed significant?

A. Well, when it's significantly different from --

THE COURT: Wait one second. I want to help somebody.

Mr. Jarrett's in the box, and he can't figure how to raise that screen. Right?

MR. JARRETT: Judge, I --

THE COURT: Pick it up from the bottom until it snaps into place. There you go.

That's why we all went to law school. Somebody had to show me that too.

THE WITNESS: You have to repeat the question. I have no idea where we're at.

THE COURT: Sorry about that.

MS. FIDLER: Oh, no.

BY MS. FIDLER:

Q. I just wanted to clarify whether -- you said 50 percent isn't really the only level that's considered significant, especially when you're looking to be protective.

A. No. The main value of the 50 percent mark there is that it's the most statistically accurate estimate. But, really, if we're talking about what a safe dose is, we'd go to the EC50s, for example, or EC20. We'd go down the levels. Because the objective then is not to compare the poisons, but to determine the doses that are relatively safe.

Q. So when you say EC20, are you saying, in effect, at 20 percent?

A. Right. Once you get below 20, for example, it's getting rather difficult to get it statistically significant different

from the controls.

Q. Thank you.

And I meant to clarify that, again, on your redirect.

MS. FIDLER: Can we pull up 12237.005. This is TREX-12237.05.

BY MS. FIDLER:

Q. This is the OSAT report that counsel was referencing in the beginning of your cross-examination.

Okay. We'll come back to that.

There were a lot of questions about Dr. Incardona's work. And I just wanted to ask just two questions on Incardona.

Does the control mortality rate in Dr. Incardona's study call into question the results of the study, in your opinion?

A. It's a little bit of a red flag, to be honest.

But the most important thing is whether you get a dose response curve. So if I saw a control mortality, let's say, above 20 percent, I really want to have a hard look at what the doses are and the response. Do they get -- does the response get increasingly worse with increasing concentration. And, in fact, that's what happens in the Incardona study. So it meets that demand.

You have to subtract more -- more of the controls, and so it actually begins to hinder the precision of the test,

but it doesn't damage it so much that it's not worthwhile anymore.

Q. And counsel for BP raised several issues with regard to the loss of some samples in that study. Is it -- is it typical for researchers to report concentrations for all of their exposure levels?

A. No. I think that that would be the ideal goal. Certainly, if you're going to be in a litigative (verbatim) atmosphere, it puts more pressure on that. But very few experiments have every single dose measured. We've been for it in our laboratory and in the litigation type of arena. So we tend to do -- we have done -- all of our doses pretty much have fall in that category.

And like I say, to be a hundred percent full standard, you'd want that, but it's seldom achieved. Several -- a lot of BP tests, for example, don't have all the doses analyzed. It's --

BY MS. FIDLER:

Q. And did --

A. -- kind of common not to.

Q. And did -- did Dr. Incardona have the concentration that you feel was necessary to accurately describe the concentrations he found?

A. Well, the bare minimum would be having that stock concentration that you ran the dilutions off of. It's the

absolute bare minimum. He -- he couldn't publish the test without that.

The other tests were done -- for the other two species were done at a much higher standard -- analytically, I should say. Biologically, they were all done at a very high standard.

Q. Counsel for BP also raised questions regarding Dr. Page's criticism of your work. Do you recall those questions?

A. I'm not sure about the questions. I certainly recall Dr. Page and the series of critical papers directed at our studies, yes.

Q. And you mentioned that you had responded to those. Has Dr. Page ever tried to duplicate your work?

A. To my knowledge, Dr. Page, in a series of those papers, has -- has never repeated -- never done an original study in the laboratory, in his laboratory toxicity tests. What he's done is critically read the papers and then basically surmise that there's an ammonia toxicity problem or there's a bacterial problem, all these sort of -- so he raises issues.

But in our studies, we'll always have controls, for example, that would take care of those sort of things. We've never found merit with any of his arguments. We've certainly responded to his arguments.

As a matter of fact, Incardona in a way responds to one of his arguments. To get around the problem of bacteria,

for example, which is a criticism of one of our tests, he used antibiotics in one of his tests with the yellowfin tuna. So he ran a test with and another replica test without antibiotics. He got the same results.

And he did that for the sole purpose, basically, of beating back the criticism of -- say, he had a bacterial problem, and that was the reason why he had the -- the low survival rates or something of that sort. Well, he proved in that test, for example, with -- with the antibiotics, that that wasn't the case.

Q. Who paid for that work; do you know?

A. Yes, I do. Those people were all Exxon contractors.

And the reason why they're continuing to raise these issues, Exxon still has litigative interests in Alaska. They still are potentially liable for basically $100 million in a reopener clause.

Q. Returning to the OSAT issue. You were shown an OSAT document -- and OSAT is from the Unified Command. To your knowledge, was the Unified Command ever trying to assess long-term harm to aquatic life?

A. No. I think what they are primarily doing is directing the response efforts. They would have been using these -- this sort of data for -- for actionable response options. They weren't into damage assessment. That's part of NRDA and also part of NOAA's responsibility, at least for the fisheries and

fish and that sort of thing, and that wasn't what that was.

MS. FIDLER: I have no further questions, Your Honor. Thank you very much.

THE COURT: All right. Thank you, Doctor.

THE WITNESS: Yes, sir.

THE COURT: The government can call its next witness. Who is the next witness?

MS. HIMMELHOCH: Captain VanHaverbeke, Your Honor.

THE COURT: Okay.

(WHEREUPON, **CAPTAIN MARK VANHAVERBEKE**, having been duly sworn, testified as follows:)

THE DEPUTY CLERK: Please state your full name and correct spelling for the record.

THE WITNESS: Captain Mark VanHaverbeke, United States Coast Guard, retired.

MR. ROBERS: May we proceed, Your Honor?

THE COURT: Sure.

MR. ROBERS: Brandon Robers for the United States.

DIRECT EXAMINATION

BY MR. ROBERS:

Q. Captain VanHaverbeke, please introduce yourself to the Court.

A. Again, it's Captain Mark VanHaverbeke, United States Coast Guard, retired.

Q. Were you asked to serve as an expert for the United States

in this case?
A. Yes.
Q. And what were you asked to do?
A. To opine on spill response, spill response research and development, and certain claims by BP in terms of development of new technologies that have improved our spill response capabilities.
Q. And what are your areas of expertise as they relate to this case?
A. Spill response and spill response research and development.
Q. Captain VanHaverbeke, as part of your work on this case, did you prepare a summary of your professional experience?
A. Yes.
MR. ROBERS: Please pull up D-33751.
BY MR. ROBERS:
Q. Is this the summary?
THE COURT: I should have said something.
Two things. First of all -- excuse me. I guess I don't have to say it; but for each of these expert witnesses, unless I say otherwise, we'll be proceeding. You can assume that I've denied the *Daubert* motion with the under -- same understanding we had in the past with past witnesses.
And also, I should have asked Ms. Kirby -- Anadarko, I haven't been asking you all if you had questions

for any of these witnesses. So unless you speak up, I'm going to assume you have no questions. Fair enough?

MS. KIRBY: Fair enough.

THE COURT: Okay. All right.

I'm sorry. Go ahead, Mr. Robers.

BY MR. ROBERS:

Q. Captain VanHaverbeke, is this the -- the summary of your professional experience that you prepared?

A. Yes.

Q. Is this a fair and accurate representation of your experience as it relates to your work in this case?

A. Yes.

Q. I'd like to briefly talk about your educational background. What degrees, if any, do you hold?

A. Bachelor's Degree in naval architecture and marine engineering from the United States Coast Guard Academy; and two Master's, one in naval architecture and marine engineering, and the second one in mechanical engineering from the University of the Michigan.

Q. And were all these degrees earned during your service to the United States Coast Guard?

A. Yes.

Q. Where are you currently employed?

A. I'm with the Coast Guard Research and Development Center.

Q. And how long have you worked at the Coast Guard Research

and Development Center?

A. I started there as a civilian employee in 2006, January of 2006.

Q. And what is your title?

A. Research engineer.

Q. What are your responsibilities as a research engineer?

A. The Coast Guard Research and Development Center supports the operational Coast Guard in all our missions. So we cover everything from search and rescue, marine pollution, maritime security, navigation safety, all the missions. And that's basically what I support.

Q. Please give a few examples of some oil spill response-related research efforts that you've been a part of.

A. When I started there in 2006, I was tasked with doing a systems analysis of spill response, which defined the system and then evaluated it, looking for the best opportunities to invest research dollars to improve the overall response.

When we completed that, we then developed a strategic plan for spill response for Coast Guard R&D, taking into account other factors besides just the systems analysis. Once we completed that, we -- we then started going after what he consider to be the best investment of our dollars, which was submerged oil.

The U.S. periodically has spills where the oil sinks and we have a real problem finding the oil and then recovering

it. So there's really not a whole lot of research going on in that area. We have relatively limited dollars, so we invested in that instead of some of the other areas. We developed a number of processes or devices which might find it, for example, laser fluorosensor that can detect oil in the water column.

I personally looked at sonar and its application. We had some others, like gas chromatography, that we tried. When we got done with that portion of the research, we then started looking at different options on how to actually recover the oil.

And then once we completed that project, the -- the focus has kind of shifted to the Arctic because there's a lot of concern that traffic and oil development is going to increase up there and we need to get better prepared for oil spill response.

Q. Have you ever published in the field of oil spill response research and development?

A. Yes.

Q. Can you describe the publication?

A. In -- I published the results of our systems analysis for the International Oil Spill Conference in 2008. I coauthored a paper on our submerged oil research, and I also was listed as a coauthor on a paper on the alternative response technology effort that we undertook at Houma.

04:29 **Q.** Have you attended professional conferences focused on oil spill response?
04:29 **A.** Yes. I -- I've attended a number of International Oil Spill conferences over the years through my career. I attended Clean Gulf a few times. Went to some inland -- Inland Oil Spill conferences, some Chemical Response conferences.
04:30 **Q.** What did you do before joining the Coast Guard's Research and Development Center?
04:30 **A.** I spent 30 years on active duty as a Coast Guard officer.
04:30 **Q.** And did you prepare a slide summarizing your work in the Coast Guard relevant to the topics you'll be offering opinions on in this case?
04:30 **A.** Yes.
04:30 **MR. ROBERS:** Please pull up D-33752.
04:30 **BY MR. ROBERS:**
04:30 **Q.** Is this the summary you just referenced?
04:30 **A.** Yes.
04:30 **Q.** Please describe some of the roles you've held during your 30 years of service in the U.S. Coast Guard that relate to your expert work in this case.
04:30 **A.** Well, starting at the bottom, after I completed my initial tour afloat on a Coast Guard cutter, I joined the staff of the Eleventh Coast Guard District in Long Beach, in the marine environmental protection and the port safety branch. My role at that point was helping the district advise the FOSCs on

basically giving advice and guidance and oversight.

I also supported my boss, who was the cochair of the Regional Response Team, in -- in his duties as cochair.

Following that, I went to Marine Safety Office Chicago, where I had various duties, but I spent a little over half my time as the court operations officer. So I was directly responsible for spill prevention and response.

After that, I went to grad school and went through a couple of technical tours. But I went back out in the field in 1991 as the executive officer of Marine Safety Office Buffalo. And in that position I was the deputy FOSC. And from that I actually fleeted up or moved up to being the commanding officer in the FOSC.

That was at a time when we were basically implementing OPA 90. We started planning and action in a community setting. As odd as it seems now, prior to OPA 90, the Coast Guard used to develop its spill response plan by itself, in-house.

Exxon Valdez showed us that that's not the way to go. So we started -- we developed an area committee. It included other federal, state, and local agencies in planning for a response. We published our first plan under that -- I don't remember whether it was '90 -- I think in '93.

But the big issue that we still had was how do you actually manage what may be a very large organization that has

to come together for a spill. And the Erie County emergency manager suggested we look at the incident command system, which we did, and we found out about, also, Unified Command, and then actually implemented that as the way we were going to do it.

And we had a full-scale exercise before I left in '95. Exercise of the Unified Command was very successful. It showed the power of it.

In fact, the -- the pipeline owner that played the responsible party said he came into the exercise expecting -- well, thinking that trying to manage an oil spill by committee was the dumbest idea he ever heard of. But then when he saw how Unified Command brings everybody together, you see the same common operative picture, hear everybody else's concerns. It really made for very powerful decision making.

So I left there and went to headquarters. I had two major projects I worked on while I was there. One was prevention through people, which was trying to inculcate the marine industry with the concept that safety really starts with people, from the boardroom to the deck plates. We can put all the rigs in one place, but the people have to make sure we're safe.

And then the second one was risk-based decision making, which became foundational in the way the Coast Guard goes about addressing any kind of risky situation, if you will.

Following that, I went back out into the field in

2000 as the commanding officer at FOSC at NSO Providence. By that point the Coast Guard headquarters had ordered the implementation of ICS and Unified Command throughout the Coast Guard response community. And my team there had already run several major events using Incident Command.

So I took a step back, and as the outsider, it looked to me like while we set up the system, we still had some concerns with certain environmental sensitivities. So we studied that and found out we had one of two nesting islands for endangered bird within Buzzards Bay, which is a national estuary. So following that exercise, we put together an island bird, whatever specific -- a species-specific response plan in case there was a spill that threatened the -- the birds.

And the year after I left under Admiral Landry, or Captain Landry at the time, they did have a spill and had to use that plan.

In 2002, I went to the First Coast Guard District where I was the chief of marine safety responsible for the Coast Guard's environmental response programs, everything from the Acadian border, where I had to work with my Acadian counterparts, to southern New Jersey. And as that, I provided oversight and guidance to all the FOSCs. I also was the cochair of regional response teams 1 and 2, my -- my cochair being the EPA.

Q. You mentioned -- you used the term "FOSC." What does that

stand for?
A. The federal on-scene coordinator. He's the person, the federal person in charge of an oil spill response.
Q. And how much time total did you spend in your career serving as either the FOSC or deputy FOSC?
A. Six years.
Q. You also mentioned regional response teams, or RRTs. How much time in your career did you spend serving on or working on RRTs?
A. I -- I worked the RRT first when I was in Long Beach in the late '70s. When I was FOSC or deputy FOSC, I would attend regional response team meetings so that I would get to know the -- the various agencies, the representatives who were there.

And then it was the three years when I was at the First Coast Guard District as chief of marine safety when I was the cochair.
Q. And what were your responsibilities as cochair of the RRT?
A. The RRTs are set up under the National Contingency Plan. There's a National Response Team that provides us guidance, and then we have responsibilities for taking that guidance. And we have our own contingency plans for the area -- for the region, regional response team.

And we provide advice and guidance to the FOSC. So, for example, our contingency plan includes preauthorization for

04:37 use of dispersants and burning in the event of a spill. And if there was a spill of significant size, we might convene the RRT to provide the FOSC support and guidance.

Q. Were the RRTs that you served on similar types of organizations as the RRT that was involved in the *Deepwater Horizon* response?

A. Yes. It's essentially identical. They're set up under the National Contingency Plan. They include the same 15 federal agencies. We all get the same guidance and direction from the plan, the National Contingency Plan, and from the National Response Team.

Q. During your Coast Guard career, did you ever have reason to consider the use of dispersants in oil spill response operations?

A. Considered it, yes. When I was in the Eleventh District, at that point in time, frankly, the consideration was the toxicity levels were too high. So generally in the U.S. they were not well-considered.

When I was in the Great Lakes, we basically took them off the table, the concern there being dispersants put the oil into the water column. And in the Great Lakes, the water column, that's the drinking water supply, so we couldn't do that.

When I went to -- when I got to Providence, dispersant toxicity had been brought down to a level where they

were now considered to be a viable option. And both the RRT, RRT 1, which is what Providence was under, had authorized and published preapproval guidelines, and our contingency plan included the possibility of using that.

But with that said, my belief for the State of Rhode Island told me that if you look at the National Contingency Plan, you --

MR. BROCK: Your Honor, I don't mean to interrupt. I'm sorry.

I object to this on hearsay, what he was told by someone in Rhode Island about dispersants.

MR. ROBERS: The witness is only speaking to his qualifications and experience in the field and not offering it for its truth.

THE COURT: Yeah, I think he -- I think he's just giving us some -- as I understand, it's his background, but maybe we can see if we can make it more a question and answer. Okay?

MR. BROCK: I apologize for interrupting.

THE COURT: Go ahead.

THE WITNESS: What he told me was, even though we had preapproval under his authority, under the National Contingency Plan, he was going to basically deny the use in the Rhode Island waters.

BY MR. ROBERS:

Q. We'll turn now to the *Deepwater Horizon* response. Were you involved in the *Deepwater Horizon* response efforts?

A. Yes.

Q. And in what capacity?

A. I was part of the alternative response technology effort down in Houma at the incident command post. And when I wasn't down there, I was part of IATAP, the Interagency Technology Assessment Program, run by the National Incident Commander while I was back at the Coast Guard R&D center.

MR. ROBERS: Your Honor, the United States offers Captain Mark VanHaverbeke as an expert in oil spill response and oil spill response research and development.

MR. BROCK: No objection.

THE COURT: Okay. No other questions, okay. Without objection, he's admitted -- he's accepted, not admitted. Admitted and accepted. It's getting late.

BY MR. ROBERS:

Q. Captain VanHaverbeke, let's turn to your expert work in this case. Are you being compensated for your work in this case?

A. I'm only receiving my salary as a civilian employee.

Q. Did you prepare any reports?

A. Yes.

Q. Please pull up TREX-013513.

Captain VanHaverbeke, is this a copy of your Round 1 expert report submitted August 15th, 2014?

A. Yes.

Q. Please pull up TREX-013514.

Captain VanHaverbeke, is this a copy of your Round 2 expert report submitted September 12th, 2014?

A. Yes.

Q. Please pull up TREX-013515.

Captain VanHaverbeke, is this a copy of your Round 3 expert report submitted September 26th, 2014?

A. Yes.

Q. Since submitting these reports, have you revised any of the calculations that they contain?

A. Yes.

Q. Please pull up D-33775.

I'm showing you a slide that contains TREX-233890.1 and TREX-233890.3. Are these documents, the revision and errata, associated with your report?

A. Yes.

Q. What was -- now turning to the errata, this would be the document on the right of the screen. What was the purpose of the errata?

A. My Round 2 report included the wrong values for how much was skimmed, burned, and dispersed. So basically, I -- I -- when that was pointed out, we corrected it. My values

included, in the total volume, the amount that was directly recovered, which was in error.

Q. And what was the purpose of the revision, this being the document on the left, TREX-233890.3?

A. Last week the Court determined what the total volume was; and based on that, I revised the numbers that I could.

Q. Now, the errata contains two values that the revision does not. Why haven't you offered updated values for the amount chemically dispersed and the amount of oil deemed unrecoverable?

A. The values come from the government's third interrogative, which is based on the oil budget calculator. The oil budget calculator starts with an assumed daily flow rate from the well.

We no longer have an assumed daily rate, so I can't figure out what the rest of the values -- those other two values are. And, unfortunately, the numbers -- the calculator uses -- it recognizes that there is uncertainty in the values, and so it has -- uses a statistical analysis to come up with what has been chemically dispersed and what's unavailable for recovery.

So I couldn't -- I'm not comfortable trying to replicate that without having somebody rerun the calculator, and I don't know that that's possible without a daily discharge rate.

04:43 **Q.** Okay. And I'll just briefly correct the record. The
04:44 revision to your report is TREX No. 233890.1.
04:44 **MR. BROCK:** I'll apologize. You're calling the
04:44 revision the January 19th, 2015 report?
04:44 **MR. ROBERS:** Yes.
04:44 **BY MR. ROBERS:**
04:44 **Q.** The revision to your report submitted January 19th is TREX
04:44 No. 233890.1. Is that correct, Captain VanHaverbeke?
04:44 **A.** Yes.
04:44 **Q.** Does the difficulty that you just described calculating
04:44 those two numbers, the amount chemically dispersed and the
04:44 amount unavailable for recovery, exist with respect to your
04:44 calculations for the amount skimmed and the amount burned?
04:44 **A.** No. The amount skimmed and the amount burned were
04:44 established separate from the calculator. The amount burned
04:44 was estimated by the burn teams. The amount skimmed was
04:45 essentially as oily liquids were brought ashore, they measured
04:45 how much they brought ashore and they assumed a certain value
04:45 for how much of it was oil versus water.
04:45 **Q.** Are all of the revisions you made to the reports contained
04:45 on the two pages shown in this demonstrative?
04:45 **A.** Yes.
04:45 **Q.** Do any of revisions alter any of the opinions that you
04:45 offer in your experts -- expert reports in this case?
04:45 **A.** No.

Q. And do these reports, including the errata and the revisions, contain the opinions that you intend to offer in this matter and the bases for those opinions?

A. Yes.

MR. ROBERS: Your Honor, I offer Captain VanHaverbeke's expert reports, including the revision and errata, Exhibits 013513, 013514, 013515, and 233890 into evidence.

THE COURT: Okay. We'll deal with those when we marshal the exhibits.

MR. ROBERS: Yes, Your Honor.

BY MR. ROBERS:

Q. Captain VanHaverbeke, do you adopt the contents of these reports as your testimony in this case?

A. Yes.

Q. Let's begin by discussing your conclusions concerning innovation in research and development. Have you prepared a summary of the conclusions you'll be discussing in your testimony today?

A. Yes.

MR. ROBERS: Please bring up D-33753.

BY MR. ROBERS:

Q. Is this the summary you just referenced?

A. Yes.

Q. And you'll be discussing three opinions; right?

A. Yes.
Q. And what are they?
A. Oil spill research and development is an ongoing process. New or innovative technologies and techniques developed *Deepwater* -- during *the Deepwater Horizon* were developed as a part of the Unified Command and the management team as a whole -- excuse me -- and response relied primarily on existing technologies.
Q. Now, prior to the *Deepwater Horizon* response, were there organizations that conducted research and development on oil spill response-related technologies?
A. Yes.
Q. Please describe a few of these organizations.
A. Well, I need to start with the Coast Guard R&D center. We've been doing spill response research since the 1970s, early '70s. Minerals Management Service, now Bureau of Safety and Environmental Enforcement, has had a very strong program through most of that.

EPA has a program. NOAA does a grant program. Right now they've got the Coastal Response Research Center out at the University of New Hampshire under grant. And there's quite a few other federal agencies doing oil spill-related response.

In fact, part of OPA 90 directed the federal government to coordinate its research and report to Congress

every other year. And coordinating that is an organization called ICCOPR, Interagency Coordinating Committee on Oil response (verbatim) -- I don't recall the exact name -- Research Programs. But -- so that -- that's on the federal side.

I know the State of Texas has got a strong program. The State of California has done a lot of research over the years. OSROs, ExxonMobil, a lot of organizations have been doing it. The Canadians have got a very strong research program. And SINTEF and some other organizations in Europe do a lot of research. So it's -- there's a lot of people that, over the years, have done significant research.

And there's private industry. A lot of the actual mechanics of what goes on out there are developed by entrepreneurs who are trying to develop a better product.

Q. Now, prior to the *Deepwater Horizon* spill, did these organizations develop technologies and techniques similar to the ones that were deployed during the *Deepwater Horizon* response?

A. Yes.

Q. Please give some examples.

A. ERMA, which maintained the COP, the Common Operating Picture, was developed by CRRC. And then skimming, burning, and dispersing have all been developed prior to the *Deepwater Horizon*.

04:49 **Q.** Did you prepare slides to help illustrate those examples?
04:49 **A.** Yes.
04:49 **MR. ROBERS:** Please bring up D-33756.
04:49 **BY MR. ROBERS:**
04:49 **Q.** Here we're looking at a slide showing TREX-242543. It's a document entitled "Interagency Coordinating Committee on Oil Pollution Research Biannual Report" for the years 2008/2009, dated December 2009.
04:49 Did you rely on this document in forming your opinions?
04:49 **A.** Yes.
04:49 **Q.** And what is this document?
04:49 **A.** This is, again, ICCOPR, the federal group that does research and is required to report to Congress biannually. This is their 2009 report.
04:49 **Q.** And how does the information in this report inform your opinions related to oil spill response?
04:49 **A.** It actually, in 2009, included a section on ERMA.
04:50 **Q.** And is there a specific passage you find particularly relevant?
04:50 **A.** Yes.
04:50 **MR. ROBERS:** Please bring up D-333757, a slide showing a call-out from TREX-242543.21.
04:50 **BY MR. ROBERS:**
04:50 **Q.** What is the significance of this passage?

A. It basically tells -- talks about ERMA and what the development was at that stage and what it was supposed to do. This was October 2009. We actually had started working on it in 2007. And I was directly involved because Dr. Nancy Kinner, who runs the CRRC, and I had a conversation, and I told her what I would -- as former FOSC, would like this system to be able to do.

So she invited me to be a part of the development team. We initially did it for Portsmouth Harbor in New Hampshire and developed the ability to expand it out over time. But the Spill of National Significance exercise done in March of 2010, a month before the *Deepwater Horizon*, rolled out ERMA as its fully developed and capable program.

Q. And just for the record, what does CRRC stand for?

A. Again, it's the Coastal -- Coastal Response Research Center.

Q. Have you prepared another example of pre-spill response-related research and development?

A. Yes.

MR. ROBERS: Please bring up D-33761.

BY MR. ROBERS:

Q. We're looking at a slide showing TREX-23990.1 and TREX-230990.2, the first two pages of a document dated March 2013, entitled "United States Coast Guard Oil Spill Response Offshore In-Situ Burning Operations Manual."

Did you rely on this document in forming your opinions?

A. Yes.

Q. And how does this document inform your opinions?

A. This -- this publication was put together by the Coast Guard R&D center following almost a decade of research relating to burning. And the date is March of 2003.

But what they did was took all the lessons learned over that decade, essentially the spill tactics and other guidance, and put them together in a manual so that federal on-scene coordinators had this guidance and could use it in the event of a spill when they needed to -- or had the capability and the time to go out and burn oil.

Q. Did you prepare any other examples of pre-spill response-related research and development?

A. Yes.

MR. ROBERS: Please bring up D-33770.

BY MR. ROBERS:

Q. We're looking at a slide showing TREX-230012, a document titled "Oil Spill Dispersants: Efficacy and Effects" from the National Research Council in 2005.

Did you rely on this document in forming your opinions?

A. Yes.

Q. And what is the document?

04:53 **A.** This is a document that was put together by a team that the National Academy of Sciences put together at the request of the Coast Guard and some other agencies.

And by way of background, the Coast Guard was considering requiring large ships -- or ships carrying large amounts of oil to have dispersant application capability as part of their response plans.

Before we did that, we needed to make sure that, A, we had a good handle on how effective dispersants were and, B, what the environmental risks were with dispersants. So we hired the National Academy of Sciences to do the study, and this was the publication they put out.

Q. And how does the information in this report inform your opinion?

A. It provides some information relating to efficacy and effects of dispersants.

Q. Is there a specific passage you find particularly relevant?

A. Yes.

MR. ROBERS: Please bring up D-33762, the slide containing call-outs from TREX-230012.19 and TREX-230012.87.

BY MR. ROBERS:

Q. What are the significance of these passages?

A. Well, the first passage, if you look at the last sentence, it speaks to the way things generally have been, and that's

that when large spills occur, primarily we rely in the U.S. on-water containment and recovery, which is skimming.

The second passage states that between 1999 and 2004, dispersants were used in a number of incidents in the Gulf of Mexico. When you look at the details, it actually should say between 1998 and 2004, but regardless, it shows that preapprovals were in place by that point and that within the Gulf of Mexico area of the United States, the use of aerial dispersants was an accepted practice.

Q. Captain VanHaverbeke, are you familiar with the Incident Command System, or ICS?

A. Yes.

Q. When was the ICS developed as an oil spill response team?

A. The *Exxon Valdez* really showed that we -- we generally, in spill response, were not prepared for major response to build up that large number of people that you might need, an organization, and manage it.

So through the '90s, the early part of the '90s, we were struggling to find a way to handle it. And a number of us discovered, if you will, Incident Command System, which was developed by the fire -- the Forest Service and the fire people.

And it showed that because it's scalable, it's modular, it was a very -- and it's very structured, it was a good way to handle what might be almost an overnight buildup of

hundreds of people in an organization.

It became so evident that it was the way to go as it was used more and more, the Coast Guard headquarters mandated its use for pollution response in the late '90s, and a few years later actually mandated its use for the entire Coast Guard operational spectrum.

Q. We just talked about ICS, ERMA burning and dispersants. Were all of these tools used during the *Deepwater Horizon* response?

A. Yes.

Q. Were they used in any way that's different than the way they are in a typical response?

A. For the *Deepwater Horizon*, the big -- the big difference was, obviously, the scale of it. We -- we had never set up an ICS that large. ERMA was new, we used it for SONs, but -- but that was it.

But the other mechanisms, skimming, burning, dispersing, they were off the shelf, but the scale of this -- this discharge and the long -- the long lead -- the long time during which it occurred were not -- were not normal.

Q. And --

A. They weren't something we had experienced in this country before.

Q. During the *Deepwater Horizon* response, what were the primary tools used to address oil in the environment?

04:57 **A.** The bulk of the oil that was addressed was done through skimming, burning, and dispersing.
04:57 **Q.** And were these response tools new or existing technologies?
04:57 **A.** They were existing technologies for the most part. And I say for the most part because we did come up with a new wrinkle with dispersants. Some work done by the Minerals Management Service in a report that they had from 1999 talked about subsea dispersants, the subsea application dispersants, and ExxonMobil contacted BP and said, there's this idea that's been out there, ExxonMobil had done some research on their own about it, and they offered that research for the response.

BP took -- took that idea to the Unified Command -- Unified Area Command. And after some significant discussion with the Unified Area Command in Washington, D.C., a series of tests were put in, and eventually this new system or this new way of applying dispersants was adopted for the response.

Q. We discussed the use of some existing tools during response. Did the response organization also include a structure for developing or evaluating new response tools?
A. Yes. The Alternative Response Technology, or ART.
Q. Was there any other structure within the response for the same purpose?
A. There was some concern early on in -- well, early on -- during May, there was concern that -- BP was getting ideas, but

04:59 the public thought that they were sitting on them. Part of the
04:59 issue we had was public awareness of what was really going on.
04:59 So to address that, the National Incident Commander
04:59 ordered the federal government to set up a parallel
04:59 organization, which was IATAP, the Interagency Technology
04:59 Assessment Program.
04:59 **Q.** And did you work on -- you worked in both these
04:59 organizations during the response; right?
04:59 **A.** Yes. Depending on whether I was in Houma or up in New
04:59 London, where the Coast Guard R&D center is.
04:59 **Q.** What was the purpose of ART?
04:59 **A.** ART kind of had two purposes, from my perspective. One
05:00 was to try to glean from the public and the industry and
05:00 everybody else new ideas and evaluate them and see if we could
05:00 improve the response.
05:00 The second part of the role that I played in Houma
05:00 was to attend planning and operational meetings to hear what
05:00 the problems were they were having during the response, the
05:00 actual people who had boots on the ground, to see if we could
05:00 then go back to ART, and then I would relay those issues back
05:00 to the ART people and see if they could find solutions.
05:00 **Q.** Was this a BP-led effort?
05:00 **A.** It was a Unified Command effort, but BP managed it out of
05:00 Houston.
05:00 **Q.** Was the process of accepting suggestions from the public

something that was unique to the *Deepwater Horizon* response?

A. No. It's something that we've dealt with in most significant spills. To the -- to the extent that RRTs II and III put together a process called ARTES, which is the Alternative Response Technology Evaluation System, but that system basically is a paper method of evaluating new ideas and providing the FOSC with suggestions on whether or not they would be implemented.

But I spoke to one of the guys that developed it, and they were thinking maybe a half dozen ideas during the response.

If you go back to the *Exxon Valdez*, we received quite a few ideas. I was in the Coast Guard headquarters at the time, but back then, people had to mail them in, what we now call snail mail. We had to type the response and mail it back.

What happened from *Exxon Valdez* to the *Deepwater Horizon* was the Internet developed, and it gave us the capability to post a web page where people could submit their ideas and the -- the way to put together a virtual team to evaluate those ideas and handle much -- much larger quantities.

MR. ROBERS: Please bring up D-33760.

BY MR. ROBERS:

Q. We're looking at a slide containing call-outs from TREX-2329867.6 and TREX-232987.9, a document entitled "Alternative Response Technology Program Final Report" dated

September 2010. Did you rely on this document in forming your opinions?

A. Yes.

Q. What is this document?

A. This was a final report put together on the ART effort published in October, I think -- maybe it says September 2010 -- basically summarizing what we did and what the lessons learned were.

Q. And how does the information in this report inform your opinion?

A. Well, it -- it provides some of the statistics. It gives a sense of the scale we were dealing with. 123,000 ideas, of which 80,000 address source control. And I wasn't part of that. But 43,000 addressing how to improve our response -- oil spill cleanup capabilities.

After sifting through that 43,000, about 100 of them got serious attention. Out of those, about 25 got actually significant use.

Captain Paskewich in his paper says 40, and I've seen other lists that we've got numbers like that. But whether it was 25 or 40, either way, out of the 43,000, narrowed it down to a very few that actually got some use.

Q. And you mentioned Captain Paskewich. Did he present a list of technologies that he claims to have been innovations stemming from the *Deepwater Horizon* response effort?

05:03 **A.** Yes. I don't recall which one of his reports, but basically he had a page of ideas that -- or -- or new concepts that were used for the *Deepwater Horizon*.

05:04 **Q.** And were all the technologies presented on that page or in his report newly invented during the response?

05:04 **A.** No. They were -- a number of them were ideas -- capabilities, tools that were literally off the shelf. Others were ideas that were adapted from other industries.

05:04 **Q.** Please provide an example of the type of off-the-shelf technology that was either adapted or specifically designed for use in oil spill response during -- used during *Deepwater Horizon* response.

05:04 **A.** The best example is the -- one of the first ones he lists is a laser fluorosensor, which was developed with Coast Guard Research and Development funding as part of our effort to address sunken oil.

05:04 **MR. ROBERS:** Please call up D-33763.

05:05 **BY MR. ROBERS:**

05:05 **Q.** We're looking at a slide containing TREX-230448, a document entitled "Alternative Response Technologies: Progressing Learnings" authored by Michael Ortiz (verbatim) and Hunter Rowe dated February 15th, 2012.

05:05 Did you rely on this document in forming your opinions?

05:05 **A.** Yes.

05:05 **Q.** And what is this document?
05:05 **A.** It's a presentation by Mike Cortez and Hunter Rowe. I think it was at the big oil spill conference in Europe.
05:05 **Q.** And -- and who are Messrs. Cortez and Rowe?
05:05 **A.** Mike Cortez was the manager for the ART effort in Houston, and Hunter Rowe was his deputy.
05:05 **Q.** And who do they work for?
05:05 **A.** BP.
05:05 **Q.** How does the information in this report inform your opinions?
05:05 **A.** Well, again, they listed a number of technologies that were brought to bear for the *Deepwater Horizon*, and again, similar to Captain Paskewich, a lot of them were already on the shelf.
05:06 **Q.** Is there a specific passage you find particularly relevant?
05:06 **A.** Yes.
05:06 **MR. ROBERS:** Please bring up D-33758, a slide containing call-outs from TREX-230448.14.
05:06 **BY MR. ROBERS:**
05:06 **Q.** What are we looking at here, Captain VanHaverbeke?
05:06 **A.** These are basically some of the devices that they listed in here. Again, the first one, the laser fluorosensor, the Coast Guard R&D center had developed before this as part of our submerged oil effort.

The Coda Octopus is a sonar with a processor that gives you what looks like a 3-D image of what the sonar is picking up. We had also -- we had tested that as part of our submerged oil and had one on hand at the R&D center and brought it to use I think off of Mobile, where we combined it with the laser fluorosensor.

And then the Wave Glider is a concept that was developed in the mid-2000s. The funding came from the Office of Naval Research, but it's essentially -- it looks like a surfboard with an umbilical cord that goes down to what looks like a venetian blind, and as waves move the surfboard up and down, it pulls up the blinds, and the water going through the blinds gives it thrust.

So this thing can go out and it -- because it's self-powered, it can stay out for long periods of time. They've sent them across the ocean.

But it's also got on it a solar panel to power its electronics, and a satellite comms link back to shore to wherever the pilot is. So it's -- what I liken them to is a pickup truck; it's -- it can do whatever you want.

So they put the sensors on it that they needed. In this case, I think they added an oxygen monitor because there was a big concern about the O2 level, a fluorosensor to see if it found any oil. And I'm not -- I don't recall what the other sensors were. But it's a technology that was adapted, but it

was developed prior to the *Deepwater Horizon*.

Q. Does this same document provide information concerning the source of other technologies that came through the ART program or were included in Captain Paskewich's report?

A. Yes. It lists quite a few of them. And as with these, it gives the source of the technology.

Q. In any case, is the source of the technology BP?

A. No.

MR. ROBERS: You can take down the slide.

BY MR. ROBERS:

Q. Do you expect that the use of the 25 or 40 or so technologies deployed during the *Deepwater Horizon* response that we've been discussing will have a positive impact on the future of oil spill response work?

A. That's tough to say. Every -- every spill is different. And whether the tools used in one will work or be applicable to the next is hard to say.

You have to remember that this spill was of such a scale and a long period that we could do things for this one, or we did do things for this one, that you wouldn't see for a normal spill.

For example, we were very concerned about wave after wave of oil coming -- coming ashore on the beaches in the Gulf. And in early May, we started looking around for what options we might have for, say -- because the way you take care of a sand

beach a lot of times is you go in and you just scoop up the sand and take it away, the oily sand, and -- and replace it.

But that was going to be counterproductive if we had to do it time after time as waves of oil came ashore. So looking around for what the options were, somebody suggested we look at the oil sands that they have up in Canada and the way that they remove the oil from the sand where up there they're trying to get the product, here we're trying to get the sand. So it's essentially the same technology.

So we did, and we ended up bringing in a device by a company called M-I SWACO, which was a -- we had a huge footprint, but what it allowed us to do, we set one up on Grand Isle. We could skim the oil -- skim the sandy oil, put it in the device, get out relatively clean sand and put it back in so it still had the same consistency as the original beach, and do that time after time in order to conserve it until after the final oil has come ashore, then you can do the final cleaning.

But it made a much more efficient process, but I don't -- I don't know of any spill where we -- any other spill in the U.S. where we would have had the justification of doing that. We don't normally have waves of oil coming ashore and we don't have that kind of duration.

Q. So is this likely to be something that's used in a typical future response?

05:11 **A.** If we have another spill of this magnitude or this kind of duration, I would think that we would consider it again.
05:11 **Q.** Ultimately, how would you rate the impact of the ART program on the overall response?
05:11 **A.** I think if you look at overall the amount of oil we took out of the environment or otherwise treated, it comes back to the burning, skimming, and dispersing. And ART had very little impact on those.
05:11 **Q.** We're now going to turn to response performance. Did you prepare a slide that summarizes the opinions you'll be testifying about today related to response performance?
05:11 **A.** Yes.
05:11 **MR. ROBERS:** Please bring up D-33754.
05:12 **BY MR. ROBERS:**
05:12 **Q.** Is this the slide that you just referred to?
05:12 **A.** Yes.
05:12 **Q.** And you'll be discussing three opinions; right?
05:12 **A.** Yes.
05:12 **Q.** What are they?
05:12 **A.** Unified Command worked well, but much of the credit goes to the many stakeholders. Adding dispersants and burning are not the same as removing oil from the environment, and that only 5 percent was mechanically removed in open-water skimming, which falls short of the typical 10 to 15 percent that we expect to see.

05:12 **Q.** Were the Coast Guard and BP the only stakeholders that participated in this response?
05:12 **A.** No. This was a very large response. I've seen a number of -- maybe a thousand different agencies and organizations that were involved.
05:12 **Q.** Can you give some examples?
05:12 **A.** Well, in addition to BP and the Coast Guard, NOAA, Fish and Wildlife Service, and the EPA had a big role. And we had the states involved as well.

A good example of somebody from the outside that I have not seen at a response before is the National Weather Service. They offered and they came to Houma and set up a cell there. And they -- you know, it was -- because we had our own weather service right there in Houma, they were able to provide much better support for air operations, whether it be the burning of oil or air dispersants. And they supported the people on the beach.

The problem -- the big concern with a lot of beach cleaning or the open -- the nearshore cleaning was the thunderstorms that might pop up in the afternoon. And because we had our own weather service there who was giving us realtime service, the people that were working onshore or nearshore knew that somebody was watching the weather. They could stay there longer and still get off in time because somebody said now is the time to clear out, which made the response more efficient.

05:14 **Q.** All right. I think you've talked about the state and federal governments. Were local governments also stakeholders in the response?
05:14 **A.** Yes. I mean, the stakeholders varied; everybody from the federals all the way down to the state, locals, academia. There were some tribal constituencies involved as well.
05:14 **Q.** How did the participation of these various stakeholders impact the response?
05:14 **A.** Well, basically it makes it better overall. For example, the example I just gave of the National Weather Service provides a capability that you don't have elsewhere.

But my experience is that when you -- because you're using a Unified Command approach, because you've got a large response with a lot of different stakeholders, you're better able to understand what the issues are. At the same time, you're bringing a broader array of capabilities to bear on the response.

05:14 **Q.** Sir, did you review Captain Paskewich's report submitted in this litigation?
05:15 **A.** Yes.
05:15 **Q.** Did he offer a typical oil recovery rate for open ocean spills?
05:15 **A.** Yes. 10 or 15 percent.
05:15 **Q.** Do you agree were that?
05:15 **A.** It's -- yes. It's kind of the number that's generally

accepted in the industry.
Q. And what's included in that 10 to 15 percent typical recovery rate?
A. Skimming, mechanical recovery.
Q. And did Captain Paskewich offer a recovery rate for the *Deepwater Horizon* response?
A. Yes.
Q. Do you agree with it?
A. No.
Q. Why not?
A. When Captain Paskewich estimated the -- how much was recovered, he included oil that was dispersed or burnt.
Q. Why shouldn't he have included oil that was dispersed or burned in his recovery rate?
A. Because burning oil and dispersing oil don't remove them from the environment; they just change the condition of the oil.
Q. Is this something that's widely understood in the response community?
A. Yes. And it's covered in the literature.
MR. ROBERS: Please bring up D-33776.
BY MR. ROBERS:
Q. We're looking at a slide that contains TREX-230012. This is a document that we looked at a little bit earlier titled "Oil Spill Dispersants, Efficacy and Effects," from the

National Research Council.

How does the information in this report inform your opinions concerning the removal of oil from the environment?

A. It has a couple of passages that mention the fate of the oil.

MR. ROBERS: Please bring up D-33759, a slide containing TREX-230012.20 and TREX-230012.28, two call-outs from the same document.

BY MR. ROBERS:

Q. What is the significance of these passages?

A. Well, the first one, the first sentence says, "Oil spill dispersants do not actually reduce the total amount of oil entering the environment," which is my position.

And the second one: "The use of chemical dispersants as well as in-situ burning revolves around changing the fate of spilled material within the environment, as opposed to attempting recovery or removal of that material."

Q. Is there other support in the response literature for this same idea?

A. Yes.

MR. ROBERS: Please bring up D-33779, a slide containing TREX-230990.

BY MR. ROBERS:

Q. Another document we looked at a little bit earlier called "United States Coast Guard Oil Spill Response Offshore, In-Situ

Operations Manual."

How does this manual inform your opinion concerning the removal of oil from the environment?

A. Again, it has sections where it discusses -- it provides the FOSC some background as to what -- what happens with the oil when it burns.

MR. ROBERS: Please bring up D-33764, a slide containing call-outs from TREX-230990.96 and 230990.144.

BY MR. ROBERS:

Q. What is the significance of these passages?

A. The first one discusses what happens when you're burning, and that's that the lighter ends, the oil will burn, but it leaves behind a viscous oil residue that is still a threat and remains in the environment unless you skim it. And I don't think we were able to skim it in this case.

And the second one talks about the fact that it emits a very dark plume, a black plume; and the remainder of the plume are particulates that go in the air, which is a concern when you're burning. You've got to make sure that you're not threatening any inhabited areas.

Q. How does all of this information inform your opinion concerning the calculation of recovery rate in the *Deepwater Horizon* response?

A. Well, basically, it supports my position that when you're trying to figure out how much is recovered, you just evaluate

what's actually been picked up, what's been skimmed or mechanically removed.

Q. And how would you perform that calculation?

A. Take the total amount of oil that's been physically recovered and divide it by the total amount of oil that was discharged.

Q. And then what would you compare that to?

A. I'd compare it to the typical rate of 10 to 15 percent that Captain Paskewich cited.

Q. And did you -- did you do this?

A. Yes.

Q. And did you prepare a slide illustrating your findings?

A. I did, yes.

MR. ROBERS: Please bring up D-33768.

BY MR. ROBERS:

Q. Is this the slide?

A. Yes.

Q. And can you please tell us what you found?

A. Well, when I did the arithmetic, basically it showed that 5 percent was recovered based on the amount of oil discharged that we were given last week. When I looked at that 5 percent compared to the 10 to 15 percent normally recovered in an open ocean spill, it's an unremarkable portion. And particularly when I look at the total volume, it shows that 95 percent of the oil remained in the environment.

05:20 **MR. ROBERS:** Thank you, Captain. I have no further questions.

05:21 **MR. BROCK:** Your Honor, may I proceed?

05:21 **THE COURT:** Yes. Go ahead.

05:20 **CROSS-EXAMINATION**

05:21 **BY MR. BROCK:**

05:21 **Q.** Captain VanHaverbeke, I am Mike Brock. I represent BPXP and I have you on cross-examination. Good afternoon.

05:21 **A.** Good afternoon.

05:21 **Q.** Let me ask you first, you agree, do you not, as the expert for the United States on source control, that BP met its obligations to respond to the *Deepwater Horizon* oil spill under the National Contingency Plan, the Oil Pollution Act, and the Clean Water Act?

05:21 **A.** You started by saying the expert on source control. I'm not an expert on source control.

05:22 **Q.** Let me rephrase the question.

You agree that BP met its obligations to respond to the *Deepwater Horizon* oil spill under the National Contingency Plan, the Oil Pollution Act, and the Clean Water Act?

05:22 **A.** Yes.

05:22 **Q.** BP met those obligations by participating in the Unified Command and working collectively with others in the Unified Command to meet the objectives of the response organization; correct?

05:22 **A.** Correct. As required by regulation.
05:22 **Q.** And BP worked together with other members of the Unified Command under the direction of the FOSC in conducting response activities; correct?
05:22 **A.** Yes.
05:22 **Q.** You would agree that collaboration and unity of effort are core tenets of the Unified Command construct?
05:22 **A.** Yes.
05:22 **Q.** The Unified Command system recognizes that a unified effort between organizations responding to an incident produces the best and most efficient response; true?
05:23 **A.** Yes.
05:23 **Q.** Do you agree that in this particular matter, the *Deepwater Horizon* response, that it involved a community effort by the Coast Guard, BP, and other members of the Unified Command?
05:23 **A.** Yes.
05:23 **Q.** It's also true, is it not, that the *Deepwater Horizon* response involved a unity of effort of the Coast Guard, BP, and other members?
05:23 **A.** Yes.
05:23 **Q.** And it's correct, sir, that official government reports documenting the response have also found that same thing to -- same issue to be true?
05:23 **A.** Yes.

05:23 **MR. BROCK:** May I have TREX-92 -- 9124.4, please.
05:23 **BY MR. BROCK:**
05:23 **Q.** Do you see, sir, that this is the cover page to the
05:23 Incident Specific Preparedness Review?
05:24 **A.** Yes.
05:24 **Q.** And this is the final report dated January 11, 2011?
05:24 **A.** Yes.
05:24 **Q.** This is an official report that was commissioned by the
05:24 United States Coast Guard; correct?
05:24 **A.** Yes.
05:24 **Q.** In fact, following major spills, the Coast Guard can call
05:24 for an independent review, or ISPR, to assess a response and
05:24 provide recommendations for improvement?
05:24 **A.** Yes. But the ISPR usually has -- the charter directs them
05:24 what exactly to look for. It's not a broad look; it's
05:24 whatever's specifically they've been charged with evaluating.
05:24 **MR. BROCK:** Let's look at TREX-9124.1.5.
05:24 **BY MR. BROCK:**
05:24 **Q.** Do you see here that this is Admiral Papp commissioning
05:24 the *Deepwater Horizon* ISPR to serve as a fact-finding body to
05:24 thoroughly review the response and recovery options, evaluate
05:25 planning assumptions, and identify strengths and weaknesses?
05:25 **A.** Yes.
05:25 **MR. BROCK:** 9124.24.4, please.

05:25 **BY MR. BROCK:**
05:25 **Q.** Do you see here he says, "I task them to critically
05:25 examine," and then down below there are a number of items that
05:25 are to be reviewed?
05:25 Do you see that?
05:25 **A.** Right.
05:25 **Q.** And the last bullet point there, consistent with what you
05:25 were telling us a few minutes ago, is that the ISPR team was to
05:25 look at the actual response efforts taken, including the
05:25 training, qualifications, and experience of responders.
05:25 Do you see that?
05:25 **A.** Yes.
05:25 **Q.** The responsible party in this case was BPXP; correct?
05:25 **A.** It was BP, yes.
05:25 **Q.** It was BPXP, wasn't it?
05:25 **A.** We all called them BP. The XP, to my knowledge --
05:26 **Q.** Did you know that the corporate --
05:26 **MR. ROBERS:** Objection, Your Honor. This is beyond
05:26 the scope of this expert's report and his examination.
05:26 **THE COURT:** Well, did you differentiate between BP,
05:26 BPXP --
05:26 **THE WITNESS:** No.
05:26 **THE COURT:** -- or any other BP entity?
05:26 **THE WITNESS:** No. When I was in Houma, it was BP, at
05:26 least from my perspective.

05:26 **BY MR. BROCK:**
Q. Have you ever seen the documents that relate to who was designated the responsible party?
A. No.
Q. When we look at the category there, the last word there, "responders," the responsible party would be in the list of responders; correct?
A. Yes.
Q. Now, you considered the ISPR in forming your expert opinions in this case; correct?
A. Yes.
Q. And you regard the ISPR as a reliable source of information about the response; correct?
A. Yes.
MR. BROCK: TREX-9124.13.6, please.
05:27 **BY MR. BROCK:**
Q. Do you see that this refers to three major areas of positive observations that merit mention?
Do you see that?
A. Yes.
Q. "The team observed that personnel provided by the responsible party" -- we'll call them BP for now since you're comfortable with that" -- and Coast Guard personnel worked effectively together and that there was 'unity of effort' throughout the response organization."

Do you see that?
A. Yes.
Q. And do you see in the next sentence that "BP has been openly cooperative in assisting the ISPR team in the research for this report"?
A. Yes.
Q. And you agree with the ISPR report with regard to its findings with regard to the RP and Coast Guard personnel working effectively together?
A. I think the whole organization worked effectively, but I think you need to go back and review why it was. It didn't just happen. We had been working the Incident Command system and the Unified Command since the '90s. And not just the Coast Guard and not just BP, but the entire spill response community has been dedicated towards coming together between the PREP program, the Pollution Response Exercise Program, the Spill of National Significance exercise program. All of these efforts post-Exxon Valdez put us in a much better position to respond to this spill.
Q. The call-out that we're looking at here, though, refers to the RP, BP, and the Coast Guard personnel; correct?
A. It says "unity of effort throughout the response organization," so I would include the many contractors that BP brought, including the spill management team.
Q. You don't dispute the statement that's made here?

05:28 **A.** No, I don't. I think it's fine, yes.
05:29 **Q.** Now, let's look at the second report that we have talked about a little bit in this case, and that is the on-scene coordinator report, *Deepwater Horizon* oil spill, TREX-9105.1.
05:29 Do you see that this is the cover page to the FOSC report?
05:29 **A.** Yes.
05:29 **Q.** This is an official report prepared by the United States Coast Guard?
05:29 **A.** Yes.
05:29 **Q.** And will you confirm, please, that the FOSC report provides the official Coast Guard record of the *Deepwater Horizon* response?
05:29 **A.** Well, I think there's a lot of other pieces to the record, but this was the FOSC's report.
05:29 **Q.** Do you agree that it is the official Coast Guard record of the response?
05:29 **A.** It's the FOSC's report on what happened.
05:29 **Q.** Let me just show you something from your deposition, and see if this helps to refresh your recollection. Page 27 at line 12.
05:30 Do you see the question there? "The FOSC report is the Coast Guard's official record of the *Deepwater Horizon* response documenting the situation as it developed" --
05:30 **A.** Yep.

05:30 **Q.** -- "the actions taken, the resources committed, and the challenges encountered during the response."

And do you see that you said yes?

A. Yes.

Q. And was that your answer at your deposition?

A. Yes.

Q. Is that your answer today?

A. Yes. It's a record, I -- yes.

Q. Now, in preparing the FOSC report, the Coast Guard interviewed more than 200 spill response (verbatim) and other experts who were involved in the response; correct?

A. I don't recall the details of that. They could quite well. I don't recall that detail.

Q. Let me see if I can refresh your recollection. Your deposition at page 27, line 18:

"In preparing the FOSC report, the Coast Guard interviewed more than 200 spill response and other experts who were directly involved in the response; right?"

And you answered "Yes."

Do you see that?

A. Yes.

Q. Was that your answer at the time of your deposition?

A. Yes. Thank you for reminding me.

Q. Do you stand by that today?

A. Yes.

05:31 **Q.** And you consider the FOSC report to be a reliable source of information, do you not, sir?
05:31 **A.** Yes.
05:31 **Q.** Let's look quickly at the executive summary, 9105.14.1.
05:31 In looking at the issue of the overall evaluation of the response, is the conclusion of the FOSC report that the *Deepwater Horizon* oil spill response was ultimately successful?
05:31 **A.** Yes.
05:31 **Q.** And that was due to the unity of effort and perseverance of the more than 1,000 organizations that contributed to the unprecedented response?
05:32 **A.** Yes.
05:32 **Q.** Did you agree with that?
05:32 **A.** Yes.
05:32 **Q.** Now, you have looked at Mr. Frank -- Captain Frank Paskewich's expert report in this case, have you not?
05:32 **A.** Yes.
05:32 **Q.** And do you recall at your deposition that we asked you about some of the documents that the Coast Guard has developed that are utilized to evaluate the success of a response effort?
05:32 **A.** Yes.
05:32 **MR. BROCK:** Can I call out, please, 230933.1.
05:32 **BY MR. BROCK:**
05:32 **Q.** Is this the August 2006 version of the Coast Guard's Incident Management Handbook?

05:32 **A.** Yes.
05:32 **Q.** And this is one of the documents you looked at in pulling together your work in this case?
05:32 **A.** Yes.
05:32 **Q.** We also talked in the deposition about a 2014 version of this -- of this same document; correct?
05:33 **A.** Yes.
05:33 **Q.** And do you recall that the criteria for success, as set out in the 2014 version, is essentially the same as what we see in this version?
05:33 **A.** Yes.
05:33 **MR. BROCK:** If I could see, please, 230933.237.1.
05:33 **BY MR. BROCK:**
05:33 **Q.** And this just refers to the best response section of the Coast Guard manual; correct?
05:33 **A.** Yes.
05:33 **Q.** Now, if we look at TREX-13132.7.1, do you see that this is Captain Paskewich's framework for evaluating the response?
05:33 **A.** Yes.
05:33 **Q.** And are we in agreement that Captain Paskewich has selected appropriate topics and methodology for evaluating the response?
05:34 **A.** He selected the ones that he thought were appropriate, yes.
05:34 **Q.** Do you take any issue with the ones that he selected?

05:34 **A.** I probably would have gone back to the best response and used that as a starting point, but --
05:34 **Q.** You didn't use the same -- you didn't use the best response methodology, nor did you use a methodology such as the one that Captain Paskewich will present; correct?
05:34 **A.** Right. I didn't do either.
05:34 **Q.** Now, in your Round 2 expert report, you shared in a summary way that there were many high points or notable achievements during the *Deepwater Horizon* response; correct?
05:34 **A.** Yes.
05:34 **Q.** And we asked you at your deposition what some of those might be. Do you remember that?
05:34 **A.** Yes.
05:34 **Q.** And is it correct that one of the high points of the *Deepwater Horizon* response was the overwhelming mobilization of people and resources for the response effort?
05:35 **A.** I think so.
05:35 **Q.** And another high point, as you've already mentioned, was the overall unity of effort that existed within the organization?
05:35 **A.** Yes.
05:35 **Q.** Just going back to the issue of the criteria that's set out in Captain Paskewich's report, do you agree that the considerations identified by the Coast Guard, in both the 2006 and 2000 versions of Incident Management Handbook and by

Captain Paskewich in his expert report, are characteristics of a successful spill response?

A. Yes.

Q. Thank you.

Now, we've talked a little bit about in-situ burning and dispersants. I want to ask you just a few questions about that, please.

It's correct, is it not, that one of the primary objectives of the response was to keep oil off of the sensitive beaches and marshes?

A. Yes, particularly the marshes.

Q. And in the response, the Unified Command, as you've said, used a variety of tools to achieve the goal of fighting the spill offshore and keeping the oil from reaching the shoreline?

A. Yes.

Q. And the tools included dispersants, in-situ burning, and skimming, among other things?

A. Yes.

Q. Do you agree, sir, that the use of in-situ burning and dispersants, as carried out by the Unified Command during the *Deepwater Horizon* response, was effective at achieving the goal of protecting the sensitive shorelines of the Gulf?

A. Yes.

Q. And do you agree that the Unified Command effectively burned and dispersed a lot of oil during the response to

05:37 achieve its objective of minimizing shoreline impact?
05:37 **A.** Yes.
05:37 **Q.** You agree that the use of in-situ burning and dispersants proved to be effective tools for removing large volumes of oil from the surface of the water?
05:37 **A.** Yes.
05:37 **Q.** And you agree that the use of in situ burning and dispersants during the response proved to be effective at preventing impacts to the sensitive shorelines?
05:37 **A.** Yes.
05:37 **MR. BROCK:** Now, could we see TREX-9105.64.3, please.
05:38 **BY MR. BROCK:**
05:38 **Q.** Do you see that this is a call-out from the operations section of the FOSC report?
05:38 **A.** Yes.
05:38 **Q.** And if I can draw your attention to the highlighted portion, do you see that it says, "However, dispersants were an effective response tool and prevented millions of gallons of oil from impacting the sensitive shorelines of the Gulf of Mexico states"?
05:38 Do you see that?
05:38 **A.** Yes.
05:38 **MR. BROCK:** Can I see 9 -- 9124.49.1, please.
05:38 **BY MR. BROCK:**
05:38 **Q.** In addition, looking at the ISPR report, the ISPR team

found that dispersants were effective on surface oil to reduce shoreline impacts and provide safety for response workers on the surface fleet?

A. Yes.

Q. Let's look at in-situ burning and what the reports say there. 9124.55.2.

This is from the ISPR report where it states, "Use of in-situ burning proved to be an effective tool for removing large volumes of oil from the water's surface."

A. Yes.

Q. And the ISB proved to be an effective tool for removing large volumes of oil; correct?

A. Yes.

Q. Preventing impact to environmentally and economically sensitive areas?

A. Yes.

Q. 9124.56.1. "The use of in-situ burning for this incident, coupled with dispersant applications, significantly reduced the amount of oil that might otherwise have impacted nearshore habitats and environmentally sensitive areas."

Do you see that?

A. Yes.

Q. And do you agree with that?

A. Yes. But it didn't remove it.

Q. Pardon?

05:40 **A.** But it didn't remove it from the environment. Let's just not sugar-coat it.
05:40 **Q.** In terms of achieving the objectives that were set by the Unified Command of keeping oil off of the sensitive shoreline, these tools that we were talking about were very effective to achieving that goal; correct?
05:40 **A.** Yes.
05:40 **Q.** Now, I want to ask you a little bit about the contributions of BP in terms of the *Deepwater Horizon* oil spill response. Okay?
05:40 The Coast Guard and BP each made significant
05:41 contributions to the *Deepwater* spill response; correct?
05:41 **A.** Yes.
05:41 **Q.** You agree that the contributions of the personnel from the Coast Guard and BP were important to achieving the success of the response?
05:41 **A.** Yes.
05:41 **Q.** This would not have been successful without the Coast Guard; correct?
05:41 **A.** Right.
05:41 **Q.** And it would not have been successful without BP; correct?
05:41 **A.** Right. And it wouldn't have been successful if we hadn't been planning and exercising for this for the past almost 20 years.
05:41 **Q.** And part of the reason that -- also, another reason that

it was successful was that BP immediately put into action its oil spill response plan and started mobilizing resources, planning for the worst, as soon as the event occurred?

A. Right.

Q. You agree that the contributions of the personnel from BP were important to achieving the success of the response?

A. Yes.

Q. Let's look at a couple of specific things that BP did. TREX-9105.131.5. This is from the logistics section of the FOSC report.

Q. "During the *Deepwater Horizon* response, most logistics requirements for response operations were provided by Responsible Party, (RP) BP, which had the necessary resources to identify, obtain, and deploy private sector response capabilities."

Do you see that?

A. Yes.

Q. And it is true, is it not, that BP was responsible for setting up the area -- the response centers and the Incident Command centers, providing the logistics for those, including much of the technology that went in, the communications, all those types of things; correct?

A. Yes.

Q. Now, if we can see 9105.131.6, again, we are in the official report of the Coast Guard, the FOSC report. We see

the response was a combined effort between the government and the RP. "The RP made large-scale and significant contributions" -- did I just read that? I think I did.

No, I didn't.

"The RP made large-scale and significant contributions to logistics, procuring much-needed resources, such as boom, skimmers, and decontamination equipment, and providing food, housing, and transportation for the more than 47,000 response personnel. The RP also managed the logistics and finance of the Vessels of Opportunity (VoO) program."

Do you see that?

A. Yes.

Q. And those were significant contributions to the response effort?

A. Yes.

Q. Now, I understand that the federal government, the states, and many other organizations participated in the response; but it's correct, isn't it, that BP provided most of the personnel who worked on the response?

A. Right, either directly or through contractors.

Q. Let me just -- to make a point of this, please look at, consistent with what you've said, TREX-247590.1.2.

Do you see that this is a *Deepwater Horizon* manpower summary?

A. Yes.

05:44 **Q.** And do you see that there is -- I've got a call-out there
05:45 that gives a total number of persons who are working in the
05:45 response on a particular day, May the 15th, 2010?
05:45 **A.** Yes.
05:45 **Q.** And do you see that that number is about 15,000 people?
05:45 **A.** Yes.
05:45 **Q.** If you come over, you see an R and you see that's a little
05:45 over a thousand people. Do you see that?
05:45 **A.** Yes.
05:45 **Q.** That's a thousand people working on behalf of the
05:45 responsible party from within their organization; correct?
05:45 **A.** It appears, yes.
05:45 **Q.** All right. And then can you see the BP contractor number
05:45 there is 15,000 -- I mean -- what is it ...
05:45 **A.** Yeah.
05:45 **Q.** Is it -- is it 17,000?
05:45 **A.** No. It's 15,233.
05:45 **Q.** Yeah, 15,233. I couldn't see it. Thank you.
05:45 So just confirming what you said a minute ago, that
05:46 the great majority of the people who were working in the
05:46 response were either BP employees or folks that BP had
05:46 contracted with to do various tasks within the response?
05:46 **A.** Yes.
05:46 **Q.** We'll turn our attention now, please, to some work that BP
05:46 did that you've talked about a little bit in your deposition.

05:46 I want to ask you first about the monies that were committed by
05:46 BP for early restoration.
05:46 You're familiar with that?
05:46 **A.** A little bit, yes. I'm not -- it's not my expertise, but
05:46 I have some familiarity with it.
05:46 **Q.** You're aware that BP voluntarily committed $1 billion to
05:46 fund early restoration projects related to the *Deepwater*
05:46 *Horizon* incident?
05:46 **A.** That was my understanding, yes.
05:46 **Q.** BP, to your understanding, also voluntarily committed
05:47 $500 million to support the Gulf of Mexico Research Initiative?
05:47 **A.** Right. I think over ten years or something like that.
05:47 **Q.** Correct.
05:47 Provided block grants to the states to advance money
05:47 for response costs?
05:47 **A.** I'm aware of it, but don't have the details.
05:47 **Q.** You are aware that they advanced money to the states to
05:47 promote tourism?
05:47 **A.** Yes.
05:47 **Q.** Do you have the details on that?
05:47 **A.** No.
05:47 **Q.** Proactively took steps to respond to economic impacts of
05:47 the spill?
05:47 **A.** Yes.
05:47 **Q.** You are aware that BP paid claims directly and without

requiring that the claims go through the Oil Spill Liability Trust Fund in the early weeks after the spill; correct?

A. Yes.

Q. And you're aware that it was not a requirement that BP pay those claims directly?

A. I was aware of it, yes.

Q. But the way in which they did it allowed the funds to be processed on a speedier time scale?

A. Yes.

MR. ROBERS: Objection. I think most of this is beyond the scope of this expert's report.

MR. BROCK: Well, this -- these are points that are within the -- the scope of oil spill response and points made in the deposition, Your Honor. It's cross-examination.

THE COURT: I don't remember him testifying in -- in that area on direct.

MR. BROCK: All right. I'll go to the ART program, Your Honor.

BY MR. BROCK:

Q. You testified a little bit about the ART program; correct, sir?

A. Yes.

Q. And you agree that during the *Deepwater Horizon*'s response, the Unified Command, including the Coast Guard and BP, adapted proven spill response technologies and employed new

or innovative technologies to fight the spill; correct?
A. Yes.
Q. Are you familiar with the innovations that took place with regard to in-situ burning?
A. My review showed that the innovations were marginal. Basically, we had the capability on the shelf, but it was all based upon tests because we'd never -- we never had the lab we had for 90 days to burn oil. So there were some improvements made, but I think they were marginal.
Q. Were you involved in the daily planning for the in-situ burns that would take place during the response?
A. No.
Q. Do you know what was discussed in the morning meetings before the crews would be sent out for in-situ burning operations?
A. Specifically, no.
Q. Do you have specific knowledge of discussions that would take place on a daily basis about the way in which in-situ burning could be managed more effectively?
A. No.
Q. Are you aware of the fact that BP, after the well was shut in and for a period of years after that, went around the world speaking to leaders of government and folks that were involved in drilling to convey lessons learned from the *Deepwater Horizon* spill?

05:50 **A.** Yes.
05:50 **Q.** Did you know that they did that approximately 200 times?
05:50 **A.** No.
05:50 **Q.** But you did know that they were doing that?
05:50 **A.** I knew they were doing that.
05:50 **Q.** And that's a good thing to do, isn't it?
05:50 **A.** Yes. But my -- my testimony was all supposed to be about the response, and that's post-response.
05:50 **Q.** Now, in your opinion, the development of new response techniques or technologies during the *Deepwater Horizon* spill resulted from collaboration. Those things that were developed came from collaboration?
05:51 **A.** Yes.
05:51 **Q.** And that BP and the Coast Guard worked together to explore and develop new technologies during the response?
05:51 **A.** We did, and we had -- there were a lot of other people coming up with ideas and --
05:51 **Q.** You agree --
05:51 **A.** -- we tried to look at them all.
05:51 **Q.** You agree that BP made contributions to that effort?
05:51 **A.** Yes.
05:51 **Q.** And during the response, BP and the Coast Guard were making considerable efforts to identify places where they could advance spill response capabilities; correct?
05:51 **A.** We were trying to find better ways to respond to the

spill, yes.

Q. Now, you were part of the ART program that you talked about during the response; correct?

A. Yes.

Q. And when you -- did you say that it produced marginal results? Was that your words?

A. Yes.

Q. And when you say "marginal," what you mean is that you didn't think that the ART program significantly increased the amount of oil that was recovered?

A. I don't think we significantly increased the amount that was recovered, burned, or dispersed.

Q. Let me just be sure we're clear on this. You're not saying that the ART program was a waste of time for the Coast Guard and BP, are you?

A. No, certainly not. I think there was a lot of value both in terms of giving the public an outlet so that they could present their ideas. And this was, in the commandant's words, "all hands on deck." So any ideas that would help us improve our recovery, we wanted to hear about it.

And, you know, it wasn't that there weren't any improvements. For example, a company up in Canada sent us these -- what looked like big basketballs that they call "ice spheres," that they sent them to us. They said, "Here, use these because they're designed to track oil."

And one of the ways we used them is the SMART team that was out tracking the effectiveness of dispersant didn't have a focal point for once they get out there. If you're out in the middle of ocean, it all looks the same. They had to back off 2 miles from the central area of the -- of where the dispersant was going to be put down. And trying to relocate that -- that location afterwards was difficult.

So they -- we gave them some of the ice spheres to use so that they -- they could go back and find them. You know, that -- that didn't impact big time, but that was a marginal improvement.

Q. All right. Let's turn to dispersant operations, if we could, please.

You agree that there were two dispersants that were utilized in the response, Corexit 9500-A and Corexit 9527-A; correct?

A. Yes.

Q. And both of those dispersants were listed on the National Contingency Plan product schedule as approved dispersant products?

A. They're not -- they're not approved. They're accepted, I think, is EPA's words. EPA's got a word. I don't recall exactly.

Q. All right. As accepted dispersant products, is that --

A. Yes.

05:54 **Q.** -- a better way of saying it?
05:54 **A.** Yes.
05:54 **Q.** And both of the dispersants that we -- we are talking about are, to this day, still included on the National Contingency Plan product schedule as acceptable dispersants for use in a spill?
05:54 **A.** Yes.
05:54 **Q.** As you've mentioned, they were applied in two ways, on the surface and at the subsea; correct?
05:54 **A.** Yes.
05:54 **Q.** And there was an RRT6 preapproved plan for the use of dispersants in the Gulf of Mexico response action; correct?
05:54 **A.** In the RRT6 area, yes.
05:54 **Q.** Yes. And the FOSC approved dispersant application during the response?
05:55 **A.** Yes.
05:55 **Q.** And as part of that work, it's also true that there was established a monitoring program for dispersant use?
05:55 **A.** I'm not sure exactly. Are you talking about the SMART program or the protocol or something else?
05:55 **Q.** I am talking about -- I am talking about the SMART protocol. The Unified Command used special monitoring of applied response technologies or what they referred to as SMART monitoring protocols; correct?
05:55 **A.** Right.

05:55 **Q.** And you agree that dispersant operations in the response were carried out safely and effectively; correct, sir?
05:55 **A.** Yes.
05:55 **Q.** And you also agree that BP provided resources that were needed to support the dispersant operations; correct, sir?
05:56 **A.** Yes.
05:56 **Q.** All right. Going back to the history of the expert reports that you have filed in this case. In your opening report, you focus primarily on technology; correct?
05:56 **A.** Yes.
05:56 **Q.** Captain Paskewich filed a report, and you put in a response to that report that addressed the issue that Captain Paskewich had referred to in terms of the effectiveness of the spill; correct?
05:57 **A.** Yes.
05:57 **Q.** And in your reply report you significantly understated the effectiveness of the combined tools of dispersants, in-situ burning, and the use of collection of oil -- or the technique of collecting the oil?
05:57 **A.** I -- I understated it did because I used the wrong denominator and corrected that in errata in December. But now we have the correct denominator, so I submitted a revised -- revision based on that.
05:57 **Q.** My question is this, though, sir: When you submitted your reply report to Captain Paskewich's opening report, you

understated the effectiveness of the intervention techniques in a pretty significant way, didn't you?

A. I don't recall the -- how significant it was, but, yes, I did understate them.

Q. You understated it by about 400,000 barrels, didn't you?

A. I used percentages; I didn't use direct numbers.

Q. Well, if we were to apply the percentages, it would be about 400,000 barrels?

A. I don't know. But it doesn't matter because the total amount discharged has been presented to us, so it's ...

Q. Now, after you presented your Round 2 report, Captain Paskewich filed a reply to the report that you filed; correct?

A. Yes. In which he pointed out that I erred.

Q. That you had made a mistake?

A. Yes.

Q. And then your deposition was taken after you saw Captain Paskewich's Round 3 report where he pointed out the mistake that you had made?

A. Yes.

MR. BROCK: Now, can we call up, please, D-35401.

BY MR. BROCK:

Q. Now, this, sir, is the exhibit that was included with Captain Paskewich's report that reflected his calculations; correct?

05:59 **A.** Yes. This looks like it came from his Round 1 report.
05:59 Did it?
05:59 **Q.** Correct, it did.
05:59 And as shown in the graphic in the opening report,
05:59 Captain Paskewich was relying on the United States
06:00 interrogatory responses that determined that about 1.2 million
06:00 barrels of oil was chemically dispersed, skimmed, and burned;
06:00 correct?
06:00 **A.** Yes.
06:00 **Q.** And from there, Captain Paskewich then calculated a
06:00 removal rate, based on that total, as a percent of both the
06:00 government's and BP's spill volume; correct?
06:00 **A.** That's what he calculated, yes.
06:00 **MR. BROCK:** Your Honor, may I approach and get to the
06:00 white board, please?
06:00 **THE COURT:** Sure. It must be late. We've resorted
06:00 to pen and paper.
06:00 **MS. HIMMELHOCH:** Your Honor, if I could ask that it
06:01 be angled just sightly more so counsel can see, or pushed back.
06:01 **MR. BROCK:** I don't know if you want to come stand in
06:01 the well or -- I wanted Judge Barbier to be able to see it.
06:01 **THE COURT:** You can come around. Maybe stand over
06:01 here. Stand over here.
06:01 **MS. HIMMELHOCH:** Thank you, Your Honor.
06:01 **MR. BROCK:** Just one second. I'm sorry.

06:01 **BY MR. BROCK:**
06:01 **Q.** All right. So if we look over to the screen, Captain Paskewich performed two calculations, if you look at the second bar going from the right; correct, sir?
06:02 **A.** Second bar from the right?
06:02 **Q.** The one that says 29 percent and 49 percent?
06:02 **A.** Yes.
06:02 **Q.** And the way in which he made the calculation about effectiveness is that he first took the government's number as to the total spill -- first of all, he took the number that the government had furnished in terms of those amounts of oil that were removed by skimming, in-situ burning, and dispersants; correct?
06:02 **A.** Yes.
06:02 **Q.** And then he did two calculations -- I'm failing. I think these may be dry erase. Let's just do it this way.
06:03 He did two calculations -- he did two calculations, one where he took the government's number on flow rate.
06:03 This was before we had Judge Barbier's ruling; correct?
06:03 **A.** Yes.
06:03 **Q.** And when he did that calculation, he found that the removal rate was 29 percent; correct?
06:03 **A.** Yes.
06:03 **Q.** And you agreed, based on what was known at the time,

06:04 assuming this 4.1 million flow rate, that this calculation was correct?

A. I agree that that is how much was treated -- was treated or burned. My difference is I don't consider that removal. Removal is what you pick up. That was dispersed into the environment.

Q. You've made that clear. I'm speaking now about keeping oil off the beaches, the goal of the response.

So it's 29 percent if you use the government's number of 4.1 million barrels, using the answer to interrogatories that was furnished by the United States of America on how much oil was removed using the techniques that we talked about; correct?

A. Was burned, dispersed, or skimmed.

Q. Correct.

And then he performs a second calculation where again he uses the same numerator, but this time the denominator is the number that BP was advancing was the flow from the well.

Do you remember that?

A. Yes.

Q. And I think he used a number, something around 2.45 million barrels of oil. Correct?

A. That looks -- yes.

Q. Okay. And that reflected a removal rate of 49 percent; correct?

A. Yes.
Q. And you agreed that that calculation was performed appropriately; correct?
A. The calculation was appropriate. But I don't, frankly -- you'll have to explain what we're talking about.
THE COURT: Well, let me interject here because it's getting late. You are using your own time, Mr. Brock. So ordinarily, I wouldn't stop you or interject.
But I have to understand where you're going with this because the points you're making, having the witness answer you now, don't seem to be something that he disputes or has disputed.
I think the difference -- the focus of his testimony, as I understand it, compared to the other expert -- what's -- I'm sorry, Captain Paskewich -- is the definition of "removal." You know, he just -- he believes -- this witness apparently believes that it doesn't remove the oil from the environment if you burn it or disperse it; only with skimming it. Your own expert apparently has a different opinion on that.
But the math is simple. We can all do the math. So it just depends what numbers you use. You're going to come up with the same -- the same result.
MR. BROCK: Yes, sir.
THE COURT: So I'm not sure where you're headed with

this. But if there's another point to be made, I'm going to let you make it.

MR. BROCK: Okay. I'll just describe it, and then -- and then I'll move on, because it may come up later.

THE COURT: Okay.

MR. BROCK: So we now have a number that is between 2.45 and 4.1 -- which we have a reality of what the flow of oil is now from your order.

THE COURT: The percentage will be between 29 and 49.

MR. BROCK: Correct. I just wanted him to confirm for the record that he was in agreement with these calculations for that reason.

THE COURT: I think we can all agree with the math.

Do you want to say something?

THE WITNESS: I can't agree with that.

THE COURT: You can't agree with that?

THE WITNESS: Because I don't -- the problem we have is -- I can tell you how much was burned --

THE COURT: I know. We're not -- we're not getting into that. He's just pointing out that if you take 1.2 million and you divide it by 3.19 million, you're going to come up with a percentage between 29 and 49; right?

THE WITNESS: But this is assuming that what is dispersed --

THE COURT: No, no. We're not assuming anything.

He's just confirming the math, the number.

THE WITNESS: Okay. But I don't know now how much was actually dispersed.

THE COURT: We're not asking you to agree with the effect of it.

THE WITNESS: No, it's not effect, Your Honor.

It's because -- because of the way the oil budget calculator works, it's based on assumed daily rate coming out of the well.

THE COURT: So you're saying if you change the larger number, the volume of oil that came out of the well, it could change the calculation of how much was dispersed?

THE WITNESS: It changes -- I don't know the calculations well enough to know what the impact is. Because what it does is it -- it says a certain percentage -- and it has allowances for the unknowns. It says a certain percentage is dispersed based on some assumed rates with variations. It says some of it gets dissolved in the water, some of it evaporates.

I tried doing it by simple math and came up with odd numbers. So I don't know. That's all I'm saying is I don't know.

MR. BROCK: Our point for Your Honor is I wanted him to confirm these numbers. We do think the number is between 29 and 49. We're going to present some evidence on that. I just

wanted him to confirm that that was his --

THE COURT: I think the problem is you're all talking past each other. Because you're talking about how much oil may have reached the beach or the shore. He's talking about how much oil was removed from the environment. So you're like two ships passing in the night. That's, I think, what we're quibbling about here.

MR. BROCK: I understand his point; I think he understands mine.

THE COURT: Okay.

MR. BROCK: But I'm just making a point on the calculation.

THE COURT: I understand. Okay. Good.

MR. ROBERS: Your Honor, it may be slightly talking past each other, but I think the distinction comes from the last question Mr. Brock asked. I don't think there's any --

THE COURT: I think I -- I understand what the witness said. He -- he's not certain about that it's that simple of a calculation; right?

THE WITNESS: Yes, sir.

THE COURT: Okay.

BY MR. BROCK:

Q. Now, one more question on this just so I have it clean for the record. At your deposition, you agreed that Captain Paskewich had accurately calculated the effectiveness of

skimming, burning, and chemical dispersing operations in the *Deepwater Horizon* response, as shown in this graphic; correct?

A. He calculated correctly based on his methods, yes.

MR. BROCK: All right. Just a few more, Judge. I apologize.

BY MR. BROCK:

Q. Captain, you know Captain Paskewich outside the context of this case, do you not?

A. Yes.

Q. And you do regard him as an expert in the area of oil spill response; correct?

A. Yes.

Q. What's the largest spill that you've ever been involved in as an FOSC?

A. As an FOSC, I don't know, it was probably around 5,000 gallons or so.

Q. 5,000 gallons?

A. Yes.

Q. How many barrels is that?

A. I would have to do the math, but it's not working in my head, no. A little over 100.

Q. Okay. About 100 barrels --

A. Well, something in excess of that, dividing by 42.

Q. All right. During the response, BP participated in community outreach efforts in addition to town hall and

expo-type meetings; is that right?
A. Yes.
Q. And it established several community outreach centers across the Gulf during the response; correct?
A. Yes.
Q. In order to interact with people and hear their concerns?
A. The purpose of their outreach centers, I think, was along those lines. They also, I think, were taking claims, but I'm not sure whether that was the same thing.
Q. They also had a call center?
A. Yes.
Q. They had community outreach personnel and hired translators to communicate with certain folks who didn't speak English?
A. Yes.
Q. The efforts -- outreach efforts have continued in the years since 2010; correct?
A. I don't know. I haven't been tracking that.
Q. Do you recall telling us that they had -- you knew that they had continued since 2010?
A. I -- I may have.
MR. BROCK: One final document, please, TREX-13518.8.1.
BY MR. BROCK:
Q. Do you see this is a community outreach, May 23rd, 2010?

06:13 **A.** Yes. What's the source of this?
06:13 **Q.** This is one of the BP documents in terms of materials that were distributed to talk about the things they were doing.
06:13 Do you see it references over 100 town halls have been held, over 11,500 volunteers registered, and over 5,600 volunteers trained across the Gulf Coast?
06:13 **A.** Yes.
06:13 **Q.** You have no reason to dispute that that occurred, do you?
06:13 **A.** No.
06:13 **MR. BROCK:** Captain, thank you very much for your time this afternoon.
06:14 **THE COURT:** Redirect?

REDIRECT EXAMINATION

BY MR. ROBERS:

06:14 **Q.** Brandon Robers for the United States.
06:14 Captain VanHaverbeke, you were asked a number of questions about the FOSC report today. Do you know when it was written?
06:14 **A.** I think it was published in 2011.
06:14 **Q.** And is the response over today?
06:14 **A.** No.
06:14 **Q.** You were also asked a series of questions about the response organization. How do you think the response went as a matter of organizational efficiency?
06:15 **A.** I think that the -- the effectiveness of the organization

as a whole -- and I think this is what the FOSC report actually covers, more than the results, was the organization -- frankly, I'm amazed at how well it went, and I attribute it to all the effort that the Coast Guard and the spill response community in general, and I would think BP as the responsible -- as somebody who is in the industry, would have had to go through a bunch of the exercises. All of the work that went into being prepared for the next major spill paid off in this event.

I think when you look at like Admiral -- Admiral Austin stated, the certifications, all that effort that people have undergone to be ready, it really showed in this spill.

Q. Do you make a distinction between organizational success and response effectiveness?

A. Yes. I -- I'm generally of the opinion that once we've had a spill, we've lost. Basically, my -- my preference is prevention, as I think everybody's would be. The problem is once the oil spills, you're fighting gravity, physics and everything else, and trying to re-corral that oil and get it picked up or even effectively burn it or anything like that is extremely difficult.

So I think in this event, contrary to the *Exxon Valdez* response organization, all of the logistics, all of that stuff worked very well. But, again, as we saw in the end, we only recovered 5 percent of the oil, which shows that we can have a great organization, but we still can't do much better.

06:16 **MR. ROBERS:** No further questions.
06:16 **THE COURT:** Thank you. You're done.
06:16 All right. We're going to recess. It's 6:15.
06:17 We'll recess until 8:00 a.m. tomorrow. Next witness -- give
06:17 me -- give me your order of witnesses. Let's just confirm
06:17 that, Ms. Himmelhoch.
06:17 **MS. HIMMELHOCH:** Sorry, struggling with the
06:17 microphone there. Our next witness is Dr. Mason. We also
06:17 have -- the four remaining expert witnesses are -- three
06:17 remaining, actually --
06:17 **THE COURT:** You still plan to -- you plan to call
06:17 three?
06:17 **MS. HIMMELHOCH:** I would expect --
06:17 **THE COURT:** Which one are you not planning to call?
06:17 **MS. HIMMELHOCH:** Oh, it is four, then. I'm sorry.
06:17 I'm losing track. Tomorrow morning we'll begin with a couple
06:17 very short deposition videos, no more than half an hour, if
06:17 even that.
06:17 Then it will be followed by Dr. Mason, then
06:17 Mr. Walkup, then Dr. Quivik and then Mr. Ratner. Given how
06:17 things have gone today, I would expect Mr. Ratner to fall over
06:17 onto Friday.
06:17 But if we get there, we'll start him tomorrow.
06:18 **THE COURT:** Okay. Anybody have anything else? All
06:18 right. Everyone have a good evening. We'll see everyone in

06:18 the morning.

06:18 **THE DEPUTY CLERK:** All rise.

06:18 (WHEREUPON, the proceedings were concluded.)

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CERTIFICATE

I, Jodi Simcox, RMR, FCRR, Official Court Reporter for the United States District Court, Eastern District of Louisiana, do hereby certify that the foregoing is a true and correct transcript, to the best of my ability and understanding, from the record of the proceedings in the above-entitled and numbered matter.

s/Jodi Simcox, RMR, FCRR
Jodi Simcox, RMR, FCRR
Official Court Reporter