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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

THIS DOCUMENT RELATES TO:  
#10-4536

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

\*\*\*\*\*

Civil Action No. 10-MD-2179  
Section J  
New Orleans, Louisiana  
January 21, 2015

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

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8 Proceedings recorded by mechanical stenography using  
9 computer-aided transcription software.

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1 AFTERNOON SESSION

2 (January 21, 2015)

3 \* \* \* \* \*

4 (OPEN COURT)

5  
6 **THE COURT:** All right. Please be seated, everyone.

7 All right. The government may call its next  
8 witness.

9 **MS. FIDLER:** Good afternoon, Your Honor.  
10 Diane Fidler for the United States. I'll be doing the direct  
11 examination of Stanley Rice.

12 **THE COURT:** Okay.

13 **MS. FIDLER:** The United States calls  
14 Dr. Stanley Rice.

15 **THE COURT:** All right. Very well.

16 And I know there's another *Daubert* -- excuse me  
17 one second, Stephanie.

18 **THE DEPUTY CLERK:** Sure.

19 **THE COURT:** I know there's another *Daubert* motion and  
20 that we're going to proceed along the same lines that we have  
21 with the last couple of witnesses. Okay?

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

23 **THE COURT:** All right. Go ahead.

24 (WHEREUPON, **DR. STANLEY RICE**, having been duly sworn,  
25 testified as follows:)

## DR. STANLEY RICE - DIRECT

01:04 1 THE DEPUTY CLERK: Please take a seat and state and  
01:04 2 spell your name for the record.

01:04 3 THE WITNESS: My name is Stanley Rice, S-T-A-N-L-E-Y,  
01:05 4 R-I-C-E.

## 5 DIRECT EXAMINATION

01:05 6 BY MS. FIDLER:

01:05 7 Q. Dr. Rice, you've been retained on behalf of the  
01:05 8 United States to serve as an expert in this case; correct?

01:05 9 A. Yes.

01:05 10 Q. What tasks were you asked to perform?

01:05 11 A. I was given two tasks. I was asked to look at the  
01:05 12 potential for toxic harm coming from the *Deepwater Horizon*  
01:05 13 spill and also to review Dr. Shea's reports.

01:05 14 Q. Dr. Rice, what do you consider to be your areas of  
01:05 15 expertise as it relates to the work you did in this case?

01:05 16 A. My area of expertise is toxicology, specifically with oil,  
01:05 17 physiology.

01:05 18 Q. All right. Dr. Rice, briefly, what is toxicology?

01:05 19 A. Toxicology is the investigation of chemicals and how they  
01:05 20 affect organisms, and the effect can be at the cellular level  
01:05 21 or tissue level of the whole organism.

01:06 22 Q. Dr. Rice, have you prepared a slide summarizing your  
01:06 23 education and experience as it relates to this case?

01:06 24 A. Yes, I have.

01:06 25 Q. Mr. Jackson, please call D-32600.

## DR. STANLEY RICE - DIRECT

01:06 1 Dr. Rice, could you please describe your educational  
01:06 2 background for the Court?

01:06 3 A. Yes. I have a Bachelor's and a Master's degree in  
01:06 4 biological science from Chico State University. I have a Ph.D.  
01:06 5 in physiology from Kent State University where I did my  
01:06 6 dissertation on ammonia toxicity to embryo -- fish embryos.

01:06 7 Q. And turning to your professional experience, are you  
01:06 8 currently retired, Dr. Rice?

01:06 9 A. Yes, I am, as of 2012, the end of.

01:06 10 Q. Where were you employed prior to your retirement?

01:06 11 A. I was employed at the Auke Bay laboratory, which is a NOAA  
01:06 12 laboratory, in Juneau, Alaska.

01:06 13 Q. How long did you work at NOAA?

01:06 14 A. I worked there for a little over 41 years.

01:06 15 Q. Could you please describe your work at NOAA as it relates  
01:06 16 to your expertise in this case?

01:06 17 A. I was hired specifically to initiate an oil effects  
01:06 18 program in Juneau, Alaska. This was just prior to the oil  
01:06 19 pipeline and large-scale transport of oil in Alaska. I was --  
01:07 20 part of my job was to recruit and hire both biologists and  
01:07 21 chemists and create this team that would do a lot of bioassay  
01:07 22 research.

01:07 23 Later on, we were deployed to the Ixtoc spill that  
01:07 24 most importantly -- I'm sorry. I was deployed to the Ixtoc  
01:07 25 spill, which was in 1979 down here in the Texas coast,



## DR. STANLEY RICE - DIRECT

01:07 1 Corpus Christi. Later on, I was deployed, along with my team,  
01:07 2 to the Exxon Valdez spill in Prince William Sound, Alaska,  
01:07 3 where we actually worked on that spill for the next 25 years.  
01:07 4 I've also been deployed to the Selendang Ayu spill and the  
01:07 5 Kuroshima spill, two different spills in the Aleutians.

01:07 6 Over the years, we did a lot of, of course, long-term  
01:07 7 effects in embryo toxicity work more related to the Exxon  
01:07 8 Valdez spill.

01:07 9 Q. Dr. Rice, have you written any peer-reviewed publications  
01:08 10 in your areas of expertise?

01:08 11 A. Yes, I have. Coming out of all that work I just  
01:08 12 described, I've published over 130 peer-reviewed publications,  
01:08 13 along with a lot of coauthors.

01:08 14 Q. Have you received any awards in your 40-year career in the  
01:08 15 field of toxicology?

01:08 16 A. Yes. I've received a bronze award along with a colleague  
01:08 17 of mine, and also later a Distinguished Career award from NOAA.  
01:08 18 And all of this is work related to the embryo toxicity work I  
01:08 19 was pioneering, and also the long-term effects of research that  
01:08 20 we were doing relative to Exxon Valdez.

01:08 21 Q. Please call TRES-13330.

01:08 22 Dr. Rice, do you recognize this document?

01:08 23 A. Yes. This would be my Round 1 report that I authored.

01:08 24 Q. And does this report contain a copy of your current CV?

01:08 25 A. Yes, it does.

## DR. STANLEY RICE - DIRECT

01:08 1 Q. And does that CV accurately summarize your qualifications  
01:08 2 in this case?

01:08 3 A. Yes.

01:08 4 Q. Please call TREX-13331.

01:09 5 What is this document?

01:09 6 A. This would be the Round 2 report that I coauthored with  
01:09 7 Dr. Don Boesch.

01:09 8 Q. And please call TREX-13332.

01:09 9 What is this document?

01:09 10 A. This would be the Round 3 report.

01:09 11 Q. Dr. Rice, did you discover any errors in your Round 3  
01:09 12 report after you filed it?

01:09 13 A. I did. During the depositions, some errors were pointed  
01:09 14 out and I corrected these. These are all in Appendixes B and  
01:09 15 C.

01:09 16 Q. And I'd like to call TREX-13332-E.

01:09 17 Is this the corrected version of those appendices?

01:09 18 A. It is.

01:09 19 Q. And I'd like to briefly clarify those errors for the  
01:09 20 Court. Please turn to TREX-13332-E.006, which is page 2 of the  
01:09 21 revised Appendix B contained in the errata. And could you  
01:10 22 please briefly describe the error in Appendix B and your  
01:10 23 correction?

01:10 24 A. This is described in this rather lengthy paragraph.

01:10 25 Basically, in the 18,000 sample database, which has

## DR. STANLEY RICE - DIRECT

01:10 1 two and a half million records in it, we had scrambled, in some  
01:10 2 cases, the depth and location records. We had mismatched them.  
01:10 3 This was corrected in this version.

01:10 4 Q. Turning to the errors in Appendix C, please turn to  
01:10 5 TREN-13332-E.018. And, I'm sorry, could you turn to the next  
01:10 6 page, .019.

01:10 7 What was the error in the original version of this  
01:10 8 appendix?

01:10 9 A. This bibliography here of effects and papers and  
01:10 10 concentrations. There's one paper, the Incardona paper, we had  
01:11 11 misidentified two species in that report and they have been  
01:11 12 corrected.

01:11 13 Q. Do these errors, as we've discussed, change the opinions  
01:11 14 set forth in your reports regarding whether there was a  
01:11 15 potential for toxicological harm as a result of the  
01:11 16 *Deepwater Horizon* spill?

01:11 17 A. No, not at all.

01:11 18 Q. Do TREN-13330, TREN-13331 and TREN-13332, along with the  
01:11 19 revisions in TREN-13332-E, accurately state your opinions and  
01:11 20 the bases therefor that you are offering to the Court in this  
01:11 21 matter?

01:11 22 A. Yes, they do.

01:11 23 MS. FIDLER: Your Honor, at this time I tender  
01:11 24 Dr. Stanley Rice as an expert in ecological toxicology and the  
01:11 25 toxicological effects of oil on marine life.

## DR. STANLEY RICE - DIRECT

01:11 1 THE COURT: All right. Other than the motion you  
01:11 2 filed, any other questions?

01:11 3 MS. KARIS: None, Your Honor.

01:11 4 THE COURT: Okay. Very well. He's accepted in that  
01:11 5 field. And let's proceed. Okay?

01:11 6 BY MS. FIDLER:

01:11 7 Q. Dr. Rice, finally, do you adopt these reports as  
01:11 8 identified, as your testimony today?

01:11 9 A. Yes, I do.

01:11 10 Q. Have you prepared a slide summarizing your key findings in  
01:12 11 this case?

01:12 12 A. Yes, I have.

01:12 13 Q. Mr. Jackson, please call D-32604.

01:12 14 Dr. Rice, is this that summary?

01:12 15 A. It is. There's --

01:12 16 Q. And, Dr. Rice, what are your key findings in assessing the  
01:12 17 potential of toxicological harm from the *Deepwater Horizon*  
01:12 18 spill?

01:12 19 A. Well, specifically about the *Deepwater Horizon* spill,  
01:12 20 there are two parts, basically, the exposure part and the harm  
01:12 21 part.

01:12 22 In both cases, I find that there is reason to believe  
01:12 23 that there was certainly toxicological exposure. That's from  
01:12 24 the unprecedented exposure to dispersed oil both at depth and  
01:12 25 also at the surface, the three months of exposure before the

## DR. STANLEY RICE - DIRECT

01:12 1 well was capped. And the PAHs most certainly, I think, reached  
01:12 2 toxic levels in many of the water samples.

01:12 3 In regards to toxicological harm, I think this is  
01:12 4 demonstrated by the previous two decades or so of research,  
01:12 5 especially on embryo toxicity, but also more specifically the  
01:13 6 embryo toxicity work, plus others, demonstrated by the  
01:13 7 *Deepwater Horizon* research.

01:13 8 Q. And two things, Dr. Rice, could you pull your microphone a  
01:13 9 little closer to you because I'm actually having trouble --

01:13 10 THE COURT: Yeah. You can move it. There you go.

01:13 11 THE WITNESS: Thank you. I'm sorry.

01:13 12 BY MS. FIDLER:

01:13 13 Q. And if you can slow down a little bit, just a tiny bit.

01:13 14 Doctor, can you discuss your third bullet here?

01:13 15 A. The third bullet, I was asked to look at Dr. Shea's  
01:13 16 analyses. And I have a conclusion there that I believe he  
01:13 17 ignores much of that current science, both the past embryo  
01:13 18 toxicity work, but also the present embryo toxicity work done  
01:13 19 specifically for this spill.

01:13 20 And I also believe that the way he's done his  
01:13 21 analyses on the water chemistries, that he hides the harm that  
01:13 22 is there.

01:13 23 Q. Dr. Rice, we'll discuss your findings in greater detail in  
01:13 24 a bit. Before we do, have you prepared a slide summarizing the  
01:14 25 methodology used in forming your opinions?

## DR. STANLEY RICE - DIRECT

01:14 1 A. Yes, I have.

01:14 2 Q. Please call up D-32605.

01:14 3 Dr. Rice, what information did you consider in  
01:14 4 forming your opinions?

01:14 5 A. Well, prior -- I used information prior to the spill.  
01:14 6 This is the several -- a couple decades of research  
01:14 7 specifically done on embryo toxicity, but other work, too. But  
01:14 8 this work basically provided the foundation, if you will, from  
01:14 9 which the *Deepwater Horizon* researchers then moved forward and  
10 gathered new data.

01:14 11 Secondly, of course, I used information specifically  
01:14 12 from the spill. I used a lot -- several peer-reviewed papers  
01:14 13 that are coming from the lab or field studies from the spill.  
01:14 14 I used the satellite footprint maps, and I also used the water  
01:14 15 chemistry data. That's that 18,000-sample database.

01:14 16 Q. Dr. Rice, why didn't you rely solely on the NRDA data, the  
01:14 17 water chemistry data?

01:14 18 A. This database is very, very large, 18,000 samples, two and  
01:15 19 a half million records. And it is not peer-reviewed yet. It  
01:15 20 hasn't been synthesized and worked over, so to speak, by the  
01:15 21 people who gathered all of that data.

01:15 22 Q. Dr. Rice, BP's expert, Dr. Shea, has stated that your  
01:15 23 analysis in this case is inconsistent with fundamental  
01:15 24 principles of toxicology. Do you agree?

01:15 25 A. Not at all.

## DR. STANLEY RICE - DIRECT

01:15 1 Q. I'd like to elaborate a bit on some of these areas of  
01:15 2 disagreement. Have you prepared a series of slides explaining  
01:15 3 key concepts in toxicology relevant to our discussion today?

01:15 4 A. I have.

01:15 5 Q. Let's start with D-32606, please.

01:15 6 Dr. Rice, could you please explain this first slide?

01:15 7 A. When you're determining mortality or survival or damage,  
01:15 8 there are really two halves to this equation. Basically,  
01:15 9 there's the exposure half, meaning the chemicals, the PAHs, all  
01:15 10 the factors that go into that, such as weathering and  
01:15 11 dispersion and bioavailability. And then there's the second  
01:15 12 half, animal sensitivity. Both boxes are very complex and I'll  
01:16 13 be speaking to the boxes.

01:16 14 Q. And please call the next slide, D-32607-A.

01:16 15 Dr. Rice, which hydrocarbon compounds are most  
01:16 16 important to understanding toxicity?

01:16 17 A. That would be the aromatic fraction. In the  
01:16 18 *Deepwater Horizon* oil and before it begins to weather, there's  
01:16 19 about 15 percent of that oil is into the aromatics. Another  
01:16 20 half -- or, actually, three-fourths of the compounds are  
01:16 21 alkanes. They're not very toxic.

01:16 22 There are tens -- or tens of thousands of compounds,  
01:16 23 possibly even more. But it's the aromatic fraction that the  
01:16 24 last several decades of research have focused on as being the  
01:16 25 most toxic.

## DR. STANLEY RICE - DIRECT

01:16 1 It's -- there are two major parts of the aromatics.  
01:16 2 There's the single-ring compounds, like benzene, and then  
01:16 3 there's the polycyclic aromatics like two-ring, three-ring,  
01:17 4 four-ring compounds.

01:17 5 And then in the next slide, I'll talk a little bit  
01:17 6 more about their solubility and toxicity relevance.

01:17 7 Q. Okay. Do aromatic compounds differ from each other in  
01:17 8 toxicity?

01:17 9 A. Oh, very much. They differ in size, they differ in  
01:17 10 chemistry basically, and that means they differ then in  
01:17 11 toxicity.

01:17 12 Q. And so let's call the next slide, D-32609.

01:17 13 Dr. Rice, how does the size of aromatics affect their  
01:17 14 toxicity?

01:17 15 A. The size affects their toxicity a lot, and it's related  
01:17 16 both to solubility and fat affinity -- related to solubility  
01:17 17 and also to fat affinity.

01:17 18 What I've got here in the far left column is the  
01:17 19 actual diagrams, if you will, of single ring on up through two,  
01:17 20 three and four-ring benzene rings. Excuse me. The smallest  
01:17 21 compound there in the lower part there, that's just one ring,  
01:17 22 that's benzene. All right. And then the next one is the two  
01:18 23 ring and the three ring.

01:18 24 As you notice, as you go up in size, you're going up  
01:18 25 in molecular size, weight, and complexity, you're actually



## DR. STANLEY RICE - DIRECT

01:18 1 decreasing the solubility as you go up. That means that the  
01:18 2 compounds that are most bioavailable -- excuse me, bioavailable  
01:18 3 in the beginning would be the smallest compounds.

01:18 4 The compounds, once they get into the animal, then  
01:18 5 they're going to be retained. The compounds that are largest,  
01:18 6 meaning those four-ring compounds, have the highest fat  
01:18 7 affinity. And there's fat in the membranes, for example, the  
01:18 8 cells. So once they get into those, they're going to want to  
01:18 9 stay. They will not want to leak out, so to speak, back into  
01:18 10 the water column very easily.

01:18 11 And this relates, then, to the toxicity. The larger  
01:18 12 the compounds, the more toxic they are. It also means that the  
01:18 13 more persistent they are.

01:18 14 Q. And just briefly, what is bioavailability?

01:19 15 A. Well, the oil in the oil droplet, unless it's ingested,  
01:19 16 it's not bioavailable. It has to -- the chemicals have to get  
01:19 17 out into the water column and then they're bioavailable to the  
01:19 18 organisms.

01:19 19 Q. So with regards to the heavier PAHs, the ones you've  
01:19 20 identified as being more toxic that also have lower solubility,  
01:19 21 how do these heavy PAHs become bioavailable to the aquatic  
01:19 22 organisms in the Gulf as a result of the *Deepwater Horizon* oil  
01:19 23 spill?

01:19 24 A. Well, even though they have a lower solubility, they  
01:19 25 certainly have some. So they do leak out of the -- exit out of

## DR. STANLEY RICE - DIRECT

01:19 1 the oil droplets and get into the water. They just do so at a  
01:19 2 slower rate.

01:19 3 Q. And how -- in particular, were there mechanisms with  
01:19 4 regard to the *Deepwater Horizon* oil spill that enhanced this  
01:19 5 solubility of the -- of the high-end PAHs?

01:19 6 A. Well, dispersions matter a lot. And I think dispersions  
01:19 7 in this particular spill, probably more significant in this  
01:20 8 spill than many other spills, because you have dispersions at  
01:20 9 depth and dispersions at the surface.

01:20 10 It's the dispersions which cause little small  
01:20 11 droplets that gives an awful lot more surface area --

01:20 12 Q. And do you --

01:20 13 A. -- for those compounds to get out.

01:20 14 Q. And do you have a slide explaining dispersion and its  
01:20 15 importance?

01:20 16 A. Yes, I do.

01:20 17 Q. Please call the next slide, D-32612-A.

01:20 18 So you started to explain it. Can we just -- one  
01:20 19 more time, what is dispersion?

01:20 20 A. Dispersion is just the forcing, so to speak, of small  
01:20 21 droplets of oil into the water column. In this cutaway  
01:20 22 diagram, a cartoon here, you see the dispersion that was in the  
01:20 23 bottom plume coming out there. There's also dispersion at  
01:20 24 the -- in the surface waters where oil droplets are beat back  
01:20 25 into the water by wave action and some physical forces there.

## DR. STANLEY RICE - DIRECT

01:20 1 Certainly chemicals, meaning dispersants, can enhance  
01:21 2 dispersions. They will increase the potential for dispersions  
01:21 3 to be formed.

01:21 4 As a toxicologist, I really don't care whether the  
01:21 5 dispersions are chemical or physical. It's the amount of  
01:21 6 dispersions that matter because that's what enhances the  
01:21 7 bioavailability. It enhances the exit of the large compounds  
01:21 8 into the solution.

01:21 9 Q. And what do you mean when you say on this slide that  
01:21 10 dispersion enhances the weathering process?

01:21 11 A. Well, there are a number of different processes of  
01:21 12 solubilization -- solubilizing, rather, of compounds. That's  
01:21 13 part of weathering. Evaporation. If it were at the surface,  
01:21 14 UV hitting the oil at the surface if it's exposed to sunlight.  
01:21 15 These -- and biodegradation, of course. All these processes  
01:21 16 are enhanced.

01:21 17 The smaller the droplets, for example, looking at  
01:21 18 biodegradation, then the more surface area there is for the  
01:21 19 bacteria to attack and start degrading that oil.

01:21 20 Q. Do all of the aromatic compounds enter the water column at  
01:22 21 the same rate?

01:22 22 A. No, not at all. It's all very dependent upon the  
01:22 23 structure. Smaller, faster; larger, slower.

01:22 24 Q. Do you have a demonstrative illustrating how aromatics  
01:22 25 become bioavailable from the dispersion process that we've been

## DR. STANLEY RICE - DIRECT

01:22 1 discussing?

01:22 2 A. I do.

01:22 3 Q. Please call D-32611.

01:22 4 Dr. Rice, what is this animation showing?

01:22 5 A. This is showing first the smaller compounds are coming out  
01:22 6 at a faster rate. You do see larger compounds coming out, but  
01:22 7 the smaller ones are coming out at a faster rate. They're all  
01:22 8 coming out, just that the rates are different.

01:22 9 Eventually, the mass is smaller and it has a higher  
01:22 10 proportion now of larger compounds, four-ring and three-ring  
01:22 11 compounds.

01:22 12 Q. Dr. Shea argues that fresh oil is more toxic than  
01:22 13 weathered oil. How do you respond to that?

01:22 14 A. He's right when he's talking about acute narcosis  
01:23 15 toxicity. That's because the smaller compound's a single ring  
01:23 16 and the two-ring compounds come out readily and they will cause  
01:23 17 narcosis.

01:23 18 For the larger compounds and the chronic toxicity,  
01:23 19 which I'll talk about shortly, he's not right about that. They  
01:23 20 come out slower and it's a different mechanism, and those  
01:23 21 compounds persist for a long time.

01:23 22 Q. I'd like to turn to the biological half of the  
01:23 23 toxicological equation you set forth earlier.

01:23 24 Please call the next slide, D-32613.

01:23 25 Dr. Rice, could you explain the other half of this

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01:23 1 toxicity equation?

01:23 2 A. Yes. The animal sensitivity part is another compartment,  
01:23 3 so to speak, compared to the chemical toxicity. It is a  
01:23 4 complex box, also. And I want to try to communicate that  
01:23 5 animal sensitivity, because there's a variety of different  
01:23 6 mechanisms and life stages, all of these interplay to -- to  
01:24 7 have a rather complex box. And I'll explain that.

01:24 8 Q. And so let's call the next slide, D-32614.

01:24 9 What are the mechanisms of oil toxicity?

01:24 10 A. Well, there are many mechanisms. There's a lot of  
01:24 11 biological targets, so to speak, for the various PAHs to -- to  
01:24 12 attack. There's cell membranes, there's organelles within the  
01:24 13 cells. There's -- DNA can be broken, for example. If enough  
01:24 14 cells are damaged, then that means the tissue is damaged; and  
01:24 15 if enough tissues are damaged, then there's a whole organism  
01:24 16 that is damaged that may suffer mortality or at least reduced  
01:24 17 fitness.

01:24 18 The mechanisms -- there are two major classes, so to  
01:24 19 speak, of toxicity. There is the acute narcosis toxicity and  
01:24 20 the chronic toxicity.

01:24 21 The acute narcosis toxicity is relatively rapid.  
01:24 22 Here the neural processes are affected, membranes, and that  
01:25 23 causes often a depression in the respiratory tissue, whether  
01:25 24 it's a human breathing, you would stop -- you would reduce your  
01:25 25 breathing, or if you're a fish, your opercula may stop or slow

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01:25 1 down working. And it leads to a relatively rapid death. If  
01:25 2 you don't get enough oxygen over a period of time, you'll  
01:25 3 certainly die. And that was -- that's what acute narcosis is  
01:25 4 about.

01:25 5 The other form of toxicity is chronic. It is a much  
01:25 6 slower type of toxicity. It's attacking, of course, the cells,  
01:25 7 organelles within the cells, the DNA, the tissues, all those  
01:25 8 things that I had mentioned earlier. The whole organism can be  
01:25 9 affected if you have enough cells or tissues. Certainly these  
01:25 10 will reduce the -- the fitness of the animal over time.

01:26 11 Sometimes these are called sublethal and some of them  
01:26 12 are, in fact. In growth, for example, you can decrease the  
01:26 13 rate of growth, which might have an ecological effect, meaning  
01:26 14 the animal is slower growing and going to be prey longer. But  
01:26 15 it also applies to cancers. Think of that pendulum swinging  
01:26 16 the other way, so to speak. That's a form of chronic toxicity,  
01:26 17 but to call it sublethal is not appropriate.

01:26 18 So those will eventually lead to death; it's just  
01:26 19 going to take a longer period of time for that death to play  
01:26 20 out.

01:26 21 Q. What is the role of life stage in determining toxicity?

01:26 22 A. Well, life stage has a huge impact on the sensitivity of  
01:26 23 the animal. We -- if you look at us humans, we, of course,  
01:26 24 think babies, of course, are more sensitive and vulnerable, and  
01:26 25 that's true. The same thing in fish embryos. Fish embryos are

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01:26 1 two and three orders of magnitude more sensitive than, say, the  
01:26 2 adults that they come from.

01:27 3 Different species have some differences in toxicity,  
01:27 4 but I think there's more of a difference in toxicity -- orders  
01:27 5 of magnitude difference between the embryonic stages compared  
01:27 6 to the adults.

01:27 7 Q. What is phototoxicity?

01:27 8 A. Phototoxicity is where a UV wave-length, sunlight, strikes  
01:27 9 a molecule and energizes it, makes it more toxic. If this  
01:27 10 happens in the water, it's not as big a deal.

01:27 11 If it happens inside a cell, in other words, a --  
01:27 12 take an embryo or a larva has a benzoapyrene molecule in it,  
01:27 13 the sunlight strikes that benzoapyrene molecule and it  
01:27 14 energizes it and makes -- and it increases the toxicity at  
01:27 15 least an order of magnitude, some people claim as -- as much as  
01:27 16 two orders of magnitude.

01:27 17 Now, that molecule is already toxic, but the  
01:27 18 UV radiation makes it even more toxic, and that's pretty  
01:27 19 critical. This is, I think, an important process with embryos  
01:28 20 and with larva. They're up near the surface, they're in the  
01:28 21 top 1 and 2 meters, for example, where sunlight, UV rays, can  
01:28 22 penetrate. And it's also these animals are translucent.

01:28 23 If you had a juvenile that has scales and pigment,  
01:28 24 the UV light doesn't penetrate that. So even though it might  
01:28 25 have, say, a benzoapyrene molecule in the liver, the UV can't

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01:28 1 touch it.

01:28 2 But if it's in that same liver, so to speak, and a  
01:28 3 larva that has no pigment in it, then that molecule can be  
01:28 4 energized and be made more toxic.

01:28 5 Q. And I'd just like to touch back on a point you just raised  
01:28 6 about liver. In terms of the life stage, what is the reason  
01:28 7 why early life stages are more sensitive, in your opinion?

01:28 8 A. Well, they have fewer -- I'll call it tools, for lack of a  
01:28 9 better word, to detoxify, for example. The liver is a great  
01:28 10 detoxifying tissue. All tissues have some level of ability to  
01:29 11 detoxify. The liver is kind of like Grand Central Station for  
01:29 12 this purpose. And, of course, a juvenile or an adult has a  
01:29 13 fully formed liver and will be functioning in this way.

01:29 14 In the case of an embryo, there may be a liver there,  
01:29 15 but it's not functioning in that capacity yet and so it just  
01:29 16 doesn't have the resources or the tools to combat toxicity as  
01:29 17 much as, say, a juvenile or an adult.

01:29 18 Q. Dr. Rice, I'd like to turn back to your opinions in this  
01:29 19 case regarding the potential serious toxicological harm. What  
01:29 20 is your opinion with regard to the potential for toxic exposure  
01:29 21 in the Gulf of Mexico as a result of the *Deepwater Horizon*  
01:29 22 spill?

01:29 23 A. Well, there are two parts to the question, exposure and  
01:29 24 then harm. And regarding exposure, there is a reason to  
01:29 25 believe that there's significant for the potential. The



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01:29 1 18,000 database, sample database, for example, has many  
01:30 2 examples of toxic concentrations in it.

01:30 3 Q. And in what level -- in what sections of the Gulf did you  
01:30 4 find potential for toxic exposure?

01:30 5 A. Several areas. Particularly the surface, upper 2 meters,  
01:30 6 the plume area where the big extensive plume existed, those are  
01:30 7 areas where oil came ashore and affected wetlands in Barataria  
01:30 8 Bay, for example, and killed the fish habitat.

01:30 9 Q. What information did you consider in forming your opinion  
01:30 10 regarding exposure?

01:30 11 A. Several pieces of data. They include the 18,000-sample  
01:30 12 database, several peer-reviewed publications, the satellite  
01:30 13 report.

01:30 14 Q. Have you prepared a slide summarizing a few of those  
01:30 15 sources?

01:30 16 A. Yes.

01:30 17 Q. Please call D-32615.

01:30 18 And what are some of these sources that you  
01:30 19 considered in your assessment of exposure?

01:30 20 A. Well, the one on the far left, for example, is the Joint  
01:31 21 Analysis report on the plume, where it existed, et cetera. The  
01:31 22 ERMA report, which has the satellite data that has the  
01:31 23 footprint -- cumulative footprint over time.

01:31 24 The -- I got a couple of peer-reviewed publications  
01:31 25 are there. One's Camilli, one of them is Diercks that report

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01:31 1 on -- on the plume. And most importantly, there's the  
01:31 2 18,000-sample database there that has the PAH chemistries  
01:31 3 within it.

01:31 4 **MS. FIDLER:** For the record, Your Honor, these are  
01:31 5 the Joint Analysis Group, "*Deepwater Horizon* Oil Spill Review  
01:31 6 of Subsurface Dispersed Oil and Oxygen Levels Associated with  
01:31 7 the *Deepwater Horizon* MC252 Spill of National Significance,"  
01:31 8 TREN-232045.

01:31 9 The ERMA database screen shot is TREN-13249.

01:31 10 The article by Camilli, et. al., "Tracking  
01:32 11 Hydrocarbon Plume Transport and Biodegradation at *Deepwater*  
01:32 12 *Horizon*" is TREN-231375.

01:32 13 Article by Diercks, et. al., "Characterization  
01:32 14 of Subsurface Polycyclic Aromatic Hydrocarbons at the *Deepwater*  
01:32 15 Site," TREN-232664.

01:32 16 And then with regard to the Gulf Science data  
01:32 17 Web site, this is a screen shot. There are actually four TREN  
01:32 18 documents associated with that because they're databases. It's  
01:32 19 TREN-233140, TREN-242621, TREN-242677, and TREN-242678.

01:32 20 **BY MS. FIDLER:**

01:32 21 **Q.** Dr. Rice, did you also consider a paper by Montagna,  
01:32 22 et. al.?

01:32 23 **A.** I did.

01:32 24 **MS. FIDLER:** And, Mr. Jackson, could you please call  
01:32 25 TREN-232045. That's not it.

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01:33 1 All right. Well, we'll see if we can fix that  
01:33 2 later, Your Honor, to get the right TREX number for that  
01:33 3 article.

01:33 4 **THE WITNESS:** It's 41.

01:33 5 **MS. FIDLER:** 232041.

01:33 6 We can correct this later, Your Honor. It's the  
01:33 7 "Deep Sea Benthic Footprint of the *Deepwater Horizon* Blowout."  
01:33 8 We'll get the TREX fixed short.

01:33 9 **THE COURT:** Okay.

01:33 10 **BY MS. FIDLER:**

01:33 11 **Q.** Dr. Rice, did you do your own analysis of the NRDA water  
01:33 12 chemistry data?

01:34 13 **A.** Well, I analyzed the sample -- I didn't analyze any  
01:34 14 chemistry samples, but I did analyze the database, yes.

01:34 15 **MS. FIDLER:** And since we have it here, Your Honor,  
01:34 16 this is TREX-232041, as Dr. Rice thankfully identified for us.

01:34 17 **BY MS. FIDLER:**

01:34 18 **Q.** Turning back to your analysis of the NRDA water chemistry  
01:34 19 data, where is that analysis set forth?

01:34 20 **A.** You mean in my report, it's in Appendix B of the  
01:34 21 third-round report as corrected.

01:34 22 **Q.** And, Dr. Rice, turning to the second part of your  
01:34 23 findings, what is your overall conclusion regarding the  
01:34 24 potential and actual toxicological effects of the *Deepwater*  
01:34 25 *Horizon* spill?

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01:34 1 A. I think there is certainly the potential for harm, and  
01:34 2 that's evidenced by several of the peer-reviewed papers that  
01:34 3 I've seen come out of the spill.

01:34 4 Q. And have you prepared a series of slides elaborating on  
01:34 5 this opinion?

01:34 6 A. I have.

01:34 7 Q. Please call D-32616.

01:34 8 What are some of the sources that you relied on in  
01:35 9 forming your opinion regarding toxic effects?

01:35 10 A. I relied on a number of papers, but these four are quite  
01:35 11 important. There's two that deal with offshore species of fish  
01:35 12 embryos by Incardona and the second one by Mager. And then the  
01:35 13 other two are killifish embryo toxicity type papers done by  
01:35 14 Whitehead and also by Dubansky.

01:35 15 Q. For the record --

01:35 16 A. Et al.

01:35 17 Q. Sorry.

01:35 18 A. Excuse me.

01:35 19 MS. FIDLER: For the record, Your Honor, these are  
01:35 20 the Incardona, et al., "*Deepwater Horizon* Crude Oil Impacts,  
01:35 21 The Developing Hearts of Large Predatory Pelagic Fish,"  
01:35 22 TREX-013333.

01:35 23 Mager, et. al., "Acute Embryonic or Juvenile  
01:35 24 Exposure to *Deepwater Horizon* Crude Oil Impairs the Swimming  
01:35 25 Performance of Mahi-Mahi," TREX-013338.

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01:36 1 TREX-231494 is the Whitehead, et. al., study,  
01:36 2 "Genomic and Physiological Footprint of *the Deepwater Horizon*  
01:36 3 Oil Spill on Resident Marsh Fishes." And, finally, TREX-231426  
01:36 4 is by Dubansky, et. al., "Multitissue Molecular, Genomic, and  
01:36 5 Developmental Effects of the *Deepwater Horizon* Oil Spill on  
01:36 6 Resident Gulf Killifish."

01:36 7 **BY MS. FIDLER:**

01:36 8 **Q.** I'd like to understand these studies a bit more starting  
01:36 9 with the significant effects that were found in these studies.  
01:36 10 Let's turn to the next slide.

01:36 11 Please call D-32617.

01:36 12 Now, before we begin, Dr. Rice, what is pericardial  
01:36 13 edema?

01:36 14 **A.** Pericardial edema is a swelling. In this case, it's  
01:36 15 around the heart. That's the pericardial part. Edema is the  
01:36 16 swelling part. And what this is, is a picture of yellowfin  
01:36 17 tuna here of embryos. The one on the right is the affected one  
01:37 18 that's been exposed to oil. And you see a very large space, it  
01:37 19 looks kind of empty, to be honest, around the heart there. The  
01:37 20 atrium is labeled.

01:37 21 **Q.** And why is this a chronic effect?

01:37 22 **A.** Well, it's a chronic effect because this animal is not  
01:37 23 dying on a very short scale. It's not dying due to narcosis.  
01:37 24 There is a brain. Basically, you have to affect the neural  
01:37 25 system in order to have a narcosis effect.

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01:37 1           There's certainly a brain that's developing in this  
01:37 2 embryo. But at this point in time, it is not in control of the  
01:37 3 animal. It's not controlling the heart rate. It's not  
01:37 4 controlling any structures, really, except for maybe the eye.  
01:37 5 So if there's an effect here, it's going to be on other --  
01:37 6 other targets, so to speak.

01:37 7 Q.   What is the source of this slide?

01:37 8 A.   This is from the Incardona paper. And this is where he's  
01:37 9 looking at the heart rate.

01:38 10 Q.   Okay. Now, Dr. Rice, can you please explain what's  
01:38 11 happening in this slide with the two species?

01:38 12 A.   I can. Let's look at the -- well, let's look at the  
01:38 13 control first. You see there's a heart pumping there. If you  
01:38 14 have -- it's pumping away. This large sac area underneath here  
01:38 15 is the yolk, along with the pericardial space.

01:38 16 Q.   Dr. Rice, do you have -- I'm sorry. Do you have a  
01:38 17 pointer?

01:38 18 A.   I do have a pointer.

01:38 19 Q.   Thank you.

01:38 20 A.   So the heart is right in that area on this animal. And if  
01:38 21 you count the heartbeats -- I'll count them real quick --  
01:38 22 there's one, two, three, four, five, six.

01:38 23           Now, let's focus over here on this animal. The heart  
01:38 24 is right there, and you see the heartbeat is quite a bit  
01:38 25 slower. Let me count them briefly. One, two, three, four. So

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01:38 1 you can see that the rate is very substantially reduced. This  
01:39 2 is an important effect because the heart is circulating the  
01:39 3 nutrients that are in the yolk on around to the rest of the  
01:39 4 tissues, the backbone, the fins, the other viscera that's  
01:39 5 developing. And those tissues are going to grow out of the  
01:39 6 food, so to speak, supplied from the yolk via the heart. So my  
01:39 7 point is that if the heart is affected, then you can expect  
01:39 8 that the downstream parts are affected.

01:39 9 This edema by itself, the swelling is -- well, if we  
01:39 10 had swelling in our ankles, for example, we may need to take a  
01:39 11 pill or something, but it's not life threatening. But a  
01:39 12 swelling around my pericardium, for example, I need to go to a  
01:39 13 hospital if I'm going to survive. It's that level of impact on  
01:39 14 the heart. And as you see, the heart rate is very reduced  
01:39 15 there.

01:39 16 Q. Dr. Rice, have you prepared a slide showing the kinds of  
01:39 17 affects that result from pericardial edema?

01:39 18 A. Yes, I have.

01:39 19 MS. FIDLER: Please call D-32618A.

01:40 20 BY MS. FIDLER:

01:40 21 Q. Dr. Rice, is this that slide?

01:40 22 A. It is.

01:40 23 Q. And it's titled "*Deepwater Horizon* Embryo Toxicity Studies  
01:40 24 Demonstrate Significant Effects."

01:40 25 Starting on the left, can you explain the -- can you

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01:40 1 explain the fish in this slide?

01:40 2 A. I can. There's two studies here. The one on the left is  
01:40 3 the Incardona study with three species. The one on the right  
01:40 4 is the Mager study with mahi-mahi. I'll explain that in a  
01:40 5 second.

01:40 6 Starting with the three species that are over here on  
01:40 7 the left, the top panel is looking at the controls. There's a  
01:40 8 bluefin tuna and then a yellowfin tuna and then the amberjack  
01:40 9 down there. Those are the controls. They're developing pretty  
01:40 10 well.

01:40 11 On the right you see the oil-exposed animals. The  
01:40 12 first thing that pops out to me is the edema and also the bent  
01:40 13 spines. This is a very customary -- or I shouldn't say  
01:40 14 customary -- a routine finding, so to speak. When you expose  
01:41 15 embryos to oil, they often have this scoliosis or bent spine  
01:41 16 type effect. The edema, of course, is very common also.

01:41 17 The fins are also often easy to detect that they're  
01:41 18 messed up. If we look at just the bottom animal where we have  
01:41 19 a nice control, and then these guys, the tail area there is  
01:41 20 messed up also. So the lowest dose that was causing this  
01:41 21 effect in the bluefin tuna was .3 parts per billion PAH, a  
01:41 22 pretty low number.

01:41 23 The -- the yellowfin was a little bit higher at  
01:41 24 1 part per billion, and higher yet for the -- for the  
01:41 25 amberjack, 6 parts per billion. Nevertheless, these are all



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01:41 1 low part per billion effects.

01:41 2 Let me explain the significance and impact over here  
01:41 3 in the mahi-mahi study done by Mager, et al. First of all,  
01:41 4 they expose the embryos to 1.2 parts per billion PAH for  
01:42 5 48 hours. And he gets the similar effect. He's getting  
01:42 6 significant edema. This is a lot more edema down here compared  
01:42 7 to the control. So he's seeing a similar effect that Incardona  
01:42 8 did in his embryo test..

01:42 9 But what he did different is that he grew these --  
01:42 10 the survivors out about -- about a month to get small juvenile  
01:42 11 fish and then he did a performance test with them. And what he  
01:42 12 found was he had a significantly reduced swimming performance  
01:42 13 in the 1.2 parts per billion PAH exposure that lasted only  
01:42 14 48 hours as an embryo.

01:42 15 And that's kind of evidence that the heart was  
01:42 16 affected, at least during the embryo part, and had downstream  
01:42 17 effects that later show up when he did the performance tests  
01:42 18 some 30-odd days later.

01:42 19 Q. And what's the significance of a reduced swim performance?

01:42 20 A. That will probably have a large effect on survival.

01:42 21 Certainly these animals that have scoliosis and whatnot, they  
01:43 22 are basically toast. They are not going to survive in the  
01:43 23 environment. They are not going to have the capability to swim  
01:43 24 and avoid predators. They may not die from the chemistry, from  
01:43 25 the PAH toxicity directly, but they will not survive in the

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01:43 1 environment.

01:43 2           These guys here certainly will survive for a while.

01:43 3 But the ones that can't swim as fast, they're called prey.

01:43 4 **Q.** Dr. Rice, BP's expert, Dr. Shea, describes these studies  
01:43 5 as novel research results. Do you agree?

01:43 6 **A.** No, I do not.

01:43 7 **Q.** Have you prepared a slide summarizing the bases for that  
01:43 8 opinion?

01:43 9 **A.** Yes, I have.

01:43 10           **MS. FIDLER:** Please call D-32619.

01:43 11 **BY MS. FIDLER:**

01:43 12 **Q.** Why do you disagree with Dr. Shea's characterization?

01:43 13 **A.** That's because there's a history in the literature of  
01:43 14 other studies that have found embryo toxic effects at low part  
01:43 15 per billion.

01:43 16           Over here on the right are the four species that we  
01:43 17 were just looking at in those embryo toxicity slides, and then  
01:44 18 these are all studies prior to that.

01:44 19           There's pink salmon studies, for example, that  
01:44 20 we've done in our lab in Alaska. Those are a species that are  
01:44 21 fairly distant, I think, from yellowfin tuna, and yet the  
01:44 22 concentrations are -- that cause effects are down in that --  
01:44 23 that area. We saw edema, for example, in those. We saw  
01:44 24 scoliosis, a bent spine problem, in exposed pink salmon. So  
01:44 25 here you have one of most extreme fish that are removed, and

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01:44 1 yet you get a similar result in terms of the effect, and you're  
01:44 2 getting it at similar doses.

01:44 3 Several other studies from other labs, herring  
01:44 4 and the fathead minnows, Japanese medaka, they're all showing  
01:44 5 low part per billion effects on those embryos also.

01:44 6 Q. Do you think -- is it your opinion that the *Deepwater*  
01:44 7 *Horizon* studies are corroborated by these earlier studies?

01:45 8 A. Yes, I think -- yeah.

01:45 9 Q. Just to clarify.

01:45 10 Not all of these studies involved MC252 oil; correct?

01:45 11 A. Correct. Only the last two studies that we're talking  
01:45 12 about from Incardona and Mager were using Macondo 252 oil. All  
01:45 13 the others were using some other oil source. The ones in  
01:45 14 Alaska, for example, were using *Exxon Valdez* oil. But the  
01:45 15 other studies were using other oils.

01:45 16 Q. Is it appropriate to use studies with different oils in  
01:45 17 assessing the potential toxicity from *the Deepwater Horizon*  
01:45 18 oil?

01:45 19 A. In principle, the answer's certainly yes. As you see  
01:45 20 here, you get similar effects at similar concentrations. So  
01:45 21 that right along tells you that. And then there's a reason.

01:45 22 Each of these oils do differ in -- in chemistry a  
01:45 23 little bit. This -- depending on what formation it came from,  
01:45 24 but yet they all have an aromatic fraction within them. They  
01:45 25 may have a little bit of differences in -- in percentages of

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01:45 1 aromatics, but they're all going to have those same aromatics.

01:46 2 And then on top of that, the water is extracting out  
01:46 3 those aromatics and it's doing so in proportion to the  
01:46 4 chemistry, to the size. So you see the same compounds, the  
01:46 5 same pHs as, for example, the very next one, Valdez, are the  
01:46 6 same pHs that are in the Macondo oil.

01:46 7 Q. Did you look at the chemistry of MC252 as it compared to  
01:46 8 the Alaskan oil tested in these studies?

01:46 9 A. Yes, I did.

01:46 10 Q. And was it -- was it similar? What's your opinion on the  
01:46 11 similarity?

01:46 12 A. Yes, it was similar. And Incardona has, you know,  
01:46 13 studied -- not this one here with the bluefin tuna, I also  
01:46 14 looked at that and compared both the effects, meaning the  
01:46 15 effect of *Deepwater Horizon* and the effect of Macondo oil on  
01:46 16 zebra fish. Got the same result, the same low PAHs, same parts  
01:46 17 per billion type of effect also.

01:46 18 Q. You stated that these are not all Gulf species. Is it  
01:46 19 appropriate to use tests on other species as a threshold for  
01:47 20 risk to Gulf species?

01:47 21 A. Well, I think your highest priority would be to use Gulf  
01:47 22 species, but certainly these results corroborate that if you  
01:47 23 want to talk about embryo toxicity, embryos from other species  
01:47 24 do corroborate these results and are predictive that -- that  
01:47 25 you would get that effect.

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01:47 1 Q. Did you look at whether the waters of the Gulf had  
01:47 2 exposure levels that reached the toxicity thresholds found in  
01:47 3 these studies?

01:47 4 A. Yes, I did.

01:47 5 MS. FIDLER: Please call D-32620-A.

01:47 6 BY MS. FIDLER:

01:47 7 Q. And I'd like to start -- I'd like you to explain this  
01:47 8 slide, starting with the source of the graph. Where did the --  
01:47 9 where did the graph come from?

01:47 10 A. This graph is produced in the -- up in the C/B of my  
01:47 11 Round 3 report, as corrected.

01:47 12 Q. And what is the key on the -- on the far right corner?

01:47 13 A. The key in the far right corner here, this box, contains  
01:48 14 the concentrations of PAH in them. So blue, for example, is .3  
01:48 15 to .5 PAH; green, .5 to 1; 1 to 2, et cetera. So this is the  
01:48 16 concentrations as they break out.

01:48 17 Q. And what are the bars? What do the bars represent?

01:48 18 A. What we did is we created the 18,000 database and sorted  
01:48 19 it in various ways. So, first of all, these are sorted by  
01:48 20 month. So you've got May, June and July. So these are the  
01:48 21 samples from that time period.

01:48 22 Secondly, we sorted only the top two meters. So this  
01:48 23 is the top 2 meters. And these are the samples from May, June,  
01:48 24 and July and the top 2 meters that are in the database within  
01:48 25 the footprint for those months.

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01:48 1 Q. And so -- and what do the fish represent on the left?

01:48 2 A. The fish over here are the species that we've just been  
01:48 3 talking about in the Incardona studies and the Mager study. So  
01:49 4 there's the bluefin, yellowfin, and amberjack that are there,  
01:49 5 the mahi-mahi from the Mager study. And those are then -- the  
01:49 6 threshold of effect that they had breaks out into these bars.

01:49 7 So let's look at just the month of May, for example.  
01:49 8 So 59 percent of the samples, for example, are .3 parts per  
01:49 9 billion or greater. So that's -- that's that story. And June,  
01:49 10 a little bit higher, almost -- a little bit over 70, 72 percent  
01:49 11 or .3 parts per billion or greater in those top 2 meters. It  
01:49 12 goes down in July.

01:49 13 And when we look at the bluefin tuna, it's at -- the  
01:49 14 threshold effect from that study was at that level. If we look  
01:49 15 at 1 part per billion, that's this level, 40 percent of the  
01:49 16 samples in May had a concentration of 1 part per billion or  
01:49 17 greater, and that's a threshold of effect that Mager was  
01:49 18 getting for that mahimahi species.

01:50 19 Q. Dr. Rice, you mentioned the Whitehead and Dubansky  
01:50 20 studies, and I'd like to turn to those. Dr. Shea doesn't rely  
01:50 21 on the Whitehead or Dubansky results in his analysis of  
01:50 22 potential toxicity, and actually rejects the Dubansky paper.

01:50 23 Do you think that's appropriate?

01:50 24 A. No, I do not.

01:50 25 Q. Have you prepared two slides explaining why the killifish

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01:50 1 results are important to the analysis of potential  
01:50 2 toxicological effects from the spill?

01:50 3 A. Yes, I have.

01:50 4 MS. FIDLER: Please call D-32622.

01:50 5 BY MS. FIDLER:

01:50 6 Q. And this slide is titled "Field Exposure: Oil Exposure to  
01:50 7 Adult Killifish Demonstrated." Can you explain this slide,  
01:50 8 please?

01:50 9 A. Right. This is basically the Whitehead paper. What he  
01:50 10 did is he went out to Grand-Terre and also some other unoiled  
01:50 11 sites, Grand-Terre Island down here in Louisiana. And from  
01:50 12 this picture here -- this is taken on the site -- you can the  
01:51 13 oil impinging upon the wetlands, shore lands there.

01:51 14 This habitat area is just prime killifish habitat.  
01:51 15 When it's flooded by high tide, the animals go in there and  
01:51 16 forage. And so you can see just from the picture that this  
01:51 17 habitat is physically -- physically exposed.

01:51 18 In addition to that, Whitehead also analyzed for  
01:51 19 CYP1A, P450 response in various tissues of these adult  
01:51 20 killifish. And what this means is that -- and there was a very  
01:51 21 significant increase, of course, in these Grande-Terre samples.  
01:51 22 What that means is that those fish were exposed.

01:51 23 This particular end slide has a very, very quick  
01:51 24 response in membrane invertebrates, fish being one, where  
01:51 25 they'll elevate this enzyme in response to PAH exposure. This

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01:51 1 doesn't necessarily indicate harm, however.

01:51 2           And -- but he did analyze also looking at hyperplasia  
01:52 3 in gill tissues. And what that means is that the tissues are  
01:52 4 kind of growing together.

01:52 5           My hand, if this were a gill, for example, these  
01:52 6 would be lamellae coming out, and their function is to increase  
01:52 7 the surface area for extracting oxygen out of the water. In  
01:52 8 hyperplasia, those grow together. They are basically inflamed  
01:52 9 and they grow together. And basically the surface area now is  
01:52 10 severely reduced.

01:52 11           The animal can still live, but now his ability to be  
01:52 12 an athlete, so to speak, to avoid a predator is very much  
01:52 13 reduced because he's just not going to have the oxygen  
01:52 14 extraction capacity. So he can walk, so to speak, but he can't  
01:52 15 run, would be an example.

01:52 16           So this is an indication of actual harm. So these  
01:52 17 animals were harmed in the environment.

01:52 18           And the Dubansky paper continued this work. Dubansky  
01:52 19 was a coauthor with Whitehead. He continues the work in 2011  
01:53 20 and continues to find a P450 response in those fish in 2011,  
01:53 21 meaning that the oil exposure continues.

01:53 22 **Q.** And turning to the next slide D-32623-A, it says, "Lab:  
01:53 23 Significant Effects on Killifish Embryos from Field Sediment  
01:53 24 Exposure Demonstrated." Can you explain the slide, please?

01:53 25 **A.** This -- this is directly from the Dubansky paper. So what



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01:53 1 he did is when they're sampling in 2010 and 2011 is they took  
01:53 2 sediments back to the lab.

01:53 3 Here he exposed embryos, killifish embryos, to those  
01:53 4 sediments. And first of all, he finds an elevated P450 in the  
01:53 5 embryos. That indicates that the embryos were truly exposed  
01:53 6 and not separate from the exposure.

01:53 7 He found similar results that we saw on the Incardona  
01:53 8 and Mager papers, saw edema around the heart, pericardial  
01:53 9 edema. He saw a decreased heart rate, and that's shown in this  
01:54 10 diagram here where -- the red box, Grand-Terre samples in 2010  
01:54 11 and 2011 are significantly reduced from the control sites, the  
01:54 12 unoiled sites.

01:54 13 The asterisk indicates that those are significantly  
01:54 14 different. The two -- there's a little bit of difference in  
01:54 15 the readings between 2010 and '11, but they are statistically  
01:54 16 not different from each other. The arrow bars overlap the  
01:54 17 means, for example, but they are both statistically  
01:54 18 significantly different from the -- from the control site.

01:54 19 So the heart rate was impacted and ultimately, the --  
01:54 20 there's decreased hatching success in these oil-exposed  
01:54 21 animals.

01:54 22 Q. Can you explain your second -- your last bullet here?

01:54 23 A. The last bullet just means that the effect was observed in  
01:54 24 2010, and it was repeated a year later with sediments collected  
01:54 25 in 2011. Got the same result, as I just indicated.

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01:55 1 That just means that the oil exposure of those  
01:55 2 sediments continues, that it -- the oil exposure just didn't go  
01:55 3 away through weathering or microbial degradation. It's still  
01:55 4 there.

01:55 5 Q. Did Dubansky and Whitehead look at any other indicators of  
01:55 6 oil exposure, potential harm, besides the ones we've talked  
01:55 7 about, the P450 enzyme response and the embryo toxicity?

01:55 8 A. They did. They tested genetic genomics responses, and  
01:55 9 what they're looking for are upregulated genes or downregulated  
01:55 10 genes. They had several thousand respond in both 2010 and  
01:55 11 2011.

01:55 12 This is from the adults. For example, it's -- that  
01:55 13 indicates that the animal's responding. It's a little bit hard  
01:55 14 to equate that to harm. It's hard to know what many of these  
01:55 15 different genes are doing. They're responding, but that  
01:55 16 doesn't tell me that they're actually harmed. Decrease in  
01:56 17 heart rate, decrease in hatching success, that's real harm.  
01:56 18 Hyperplasia in the gill, that's harm.

01:56 19 Q. Dr. Rice, I would now like to turn to Dr. Shea's toxicity  
01:56 20 analysis and your response to it. Have you prepared a series  
01:56 21 of slides explaining your response to Dr. Shea's analysis of  
01:56 22 potential toxicological harm?

01:56 23 A. Yes, I have.

01:56 24 MS. FIDLER: Please call D-32624.  
25

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01:56 1 BY MS. FIDLER:

01:56 2 Q. Can you summarize your disagreements with Dr. Shea for the  
01:56 3 Court. And afterwards we'll go into them in a little bit more  
01:56 4 detail.

01:56 5 A. Yes, I can. Briefly, we both looked at the same water  
01:56 6 chemistry database, that 18,000-sample database with all the  
01:56 7 PAH chemistries in it, and we both have a common understanding  
01:56 8 of PAH composition and PAH concentration. They're both  
01:56 9 important.

01:56 10 Underlying after that, though, we begin to diverge.  
01:56 11 Basically, first -- my first criticism is that he rejects  
01:57 12 the -- the literature that was in support prior to the  
01:57 13 *Deepwater Horizon* embryo toxicity work that I talked about  
01:57 14 earlier. And then more specifically, he's rejecting the  
01:57 15 Incardona and Mager papers, the Whitehead and the Dubansky  
01:57 16 papers. He's rejecting that science. He's not evaluating them  
01:57 17 in terms of relative to his toxic unit approach.

01:57 18 My second item is that he's rejecting -- he's  
01:57 19 criticizing their methodologies, especially the mixing method  
01:57 20 and that sort of thing. That's one thing.

01:57 21 Third, he's using a toxic unit approach, and I think  
01:57 22 he uses that rather inappropriately at times. Fourth, or  
01:57 23 lastly, he's also diluting the toxic water results via some  
01:57 24 summarizing statistics and graphics.

01:57 25 Q. Okay. Since you've discussed the first bullet, I'd like

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01:57 1 to turn to your second point regarding methodology.

01:58 2 To clarify for the Court, what kind of tests were  
01:58 3 involved in the -- in the studies you've been talking about,  
01:58 4 the embryo studies?

01:58 5 A. The embryo toxicity studies, those are all laboratory  
01:58 6 bioassays.

01:58 7 Q. And very generally speaking, what is a laboratory  
01:58 8 bioassay?

01:58 9 A. Basically it's where you're exposing the subject animal --  
01:58 10 in this case, the embryos, you're exposing them to a series of  
01:58 11 solutions with oil in them, mixed into them. Plus, you'll  
01:58 12 always have a control to compare the response that you're  
01:58 13 measuring, whether it's survival or heart rate or whatever.

01:58 14 Q. And what are you looking for in a -- in a bioassay?

01:58 15 A. You're looking -- in this case, you're looking for what is  
01:58 16 the threshold of effect. You're trying to find what doses are  
01:58 17 safe, what doses are harmful.

01:58 18 Q. You've stated you've conduct -- conducted bioassays  
01:58 19 before. How many have you conducted?

01:58 20 A. At least hundreds, probably in the thousands.

01:58 21 Q. And what species have you tested?

01:58 22 A. A number of species. Of course, they're mostly from  
01:59 23 Alaska, the Arctic down to southeast of invertebrates, such as  
01:59 24 shrimp and crabs and mussels, on up through fish, the  
01:59 25 vertebrates fish, and also a number of life stages going from

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01:59 1 embryos on up to juveniles and adults.

01:59 2 Q. Turning specifically to some of Dr. Shea's critiques  
01:59 3 regarding the methods, I'd like to call D-32625.

01:59 4 All right. Starting with the first critique listed,  
01:59 5 could you explain Dr. Shea's critique of the methods you and  
01:59 6 other researchers such as Drs. Incardona and Mager have used?

01:59 7 A. Well, basically his first criticism, or a large criticism  
01:59 8 is that he states or complains that the HEWAF method, that's  
01:59 9 high-energy WAF, water accommodated fraction, is a nonstandard  
10 mixing method.

01:59 11 Q. And I'd like to break this down a bit. What is a water  
12 accommodated fraction, or WAF?

01:59 13 A. Water accommodated fraction means that those PAHs are  
14 inserted into the solution.

02:00 15 Q. And -- and what is a HEWAF?

02:00 16 A. HEWAF means high energy, so a lot of energy is used in the  
17 mixing in order to get the PAHs into solutions.

02:00 18 Q. And what role does the mixing method play in generating a  
19 WAF?

02:00 20 A. The mixing method has a -- has a lot to do with -- with  
21 the resulting composition. If you're using a slow mixing  
22 method, then you'll get a solution that is dominated by the  
23 light ends, single rings of fresh oil and not weathered. Or if  
24 it is, it will be the -- weathered a little bit, it will be the  
25 two-ring compositions.

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02:00 1 If you use high energy, then you're going to get some  
02:00 2 of these three -- a lot of these three- and four-ring compounds  
02:00 3 inserted into the solution. So you affect the composition  
02:00 4 quite significantly, depending on which -- what method you use.

02:00 5 Q. And if I can slow you down a little bit, because that went  
02:01 6 pretty quickly.

02:01 7 What do you then do with the WAF?

02:01 8 A. Well, you collect the -- the WAF, and that's what you  
02:01 9 dilute to various -- various intermediate concentrations, and  
02:01 10 you expose your subject animals to that.

02:01 11 Q. Okay. Is there a standard legally required mixing method  
02:01 12 for conducting bioassay research?

02:01 13 A. No, not at all.

02:01 14 Q. And have you used a variety of mixing methods in the  
02:01 15 research you've conducted?

02:01 16 A. I have. I've used energy methods such as a slow mix that  
02:01 17 Dr. Shea prefers and on up through a series of paint stirrers  
02:01 18 and including high-energy WAFs out of blenders.

02:01 19 Q. How do you respond to this critique by Dr. Shea regarding  
02:01 20 the use of high-energy blenders to create HEWAF?

02:01 21 A. Well, certainly, you get different compositions, but --  
02:02 22 out of different mixing methods, but I don't buy off on that.  
02:02 23 Basically what you really need to know is what is the  
02:02 24 composition and what is the concentration. And if you're  
02:02 25 trying to mimic the -- what you find in the environment, then

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02:02 1 you need to adapt your mixing method that will give you the  
02:02 2 type of composition you need.

02:02 3 So in the case of the Gulf waters, which had a lot of  
02:02 4 dispersion -- dispersions of depth, dispersions at the surface,  
02:02 5 chemically enhanced probably, there is a lot of three-ring and  
02:02 6 four-ring compounds inserted into solution by -- in -- in the  
02:02 7 environment.

02:02 8 And so Incardona, for example, used the HEWAF in  
02:02 9 order to produce compositions and concentrations that were  
02:02 10 similar to what he found in the -- in the environment.

02:02 11 As a matter of fact, in his paper, he has those three  
02:02 12 different species, he's actually taken a sample out of three  
02:03 13 different cruises and copied, if you will -- "mimicked" I guess  
02:03 14 would be a better word -- mimicked, the composition that was  
02:03 15 found in samples from each of those three cruises.

02:03 16 Q. So just to clarify, he's making that sure that the  
02:03 17 exposure -- the composition of the PAHs in his exposure  
02:03 18 solution closely approximates, if not matches as closely as  
02:03 19 possible, what he actually saw in the field. Is that a fair  
02:03 20 assessment?

02:03 21 A. Yeah. Another way to put it, he's making sure that his  
02:03 22 exposure solutions are relevant to the environment, both in  
02:03 23 composition and in concentration.

02:03 24 Q. Would the slow mixing methods preferred by Dr. Shea,  
02:03 25 the -- the so-called standard methods, have been better for

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02:03 1 achieving this?

02:03 2 A. Not for this -- not for this spill. He couldn't have  
02:03 3 inserted the three and four rings into the solution using that  
02:03 4 method; therefore, there would have been a lot of samples that  
02:03 5 he couldn't have mimicked that were found in the environment.

02:04 6 Q. How are you able to know that a PAH solution is mimicking  
02:04 7 the field conditions?

02:04 8 A. You have to have some very sophisticated analysis. These  
02:04 9 are commonly called GCMS, that's gas chromatograph mass spec.  
02:04 10 The gas chromatograph separates out the individual PAHs into  
02:04 11 the various component parts, and then the mass spec analyzes,  
02:04 12 determines what the quantity is of each of those different  
02:04 13 PAHs.

02:04 14 So that gives you concentration and composition. It  
02:04 15 takes that sophisticated analysis to do that.

02:04 16 MS. FIDLER: And can we go back to the last slide.

02:04 17 BY MS. FIDLER:

02:04 18 Q. Can you please describe the second critique you've listed  
02:04 19 here?

02:04 20 A. The second critique from Dr. Shea is that he says that the  
02:04 21 lab conditions represent the worst-case scenario.

02:04 22 Q. And how do you respond to that?

02:04 23 A. I don't agree with that.

02:04 24 Q. Why not?

02:04 25 A. Well, the lab situation is kind of a perfect environment,



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02:05 1 so to speak, except for having the toxin, of course. But it  
02:05 2 doesn't have predators, it doesn't have a changing physical  
02:05 3 environment, it doesn't have a change in temperature or  
02:05 4 salinity or UV, for that matter. So it's kind of a perfect  
02:05 5 world, so to speak.

02:05 6 The bioassays that we've done, our experience, I  
02:05 7 should say, have found that when you expose an animal and he's  
02:05 8 released in the environment, his survival potential is actually  
02:05 9 less than what you might predict just from the chemistry of the  
02:05 10 toxicant alone.

02:05 11 Q. I want to clarify briefly what difference exists between  
02:05 12 your method of analyzing the water chemistry and the one used  
02:05 13 by Dr. Shea. First, on the exposure side, is there any  
02:05 14 difference in the water chemistry data that you and Dr. Shea  
02:05 15 looked at?

02:05 16 A. No, we looked at the same sample set and the same PAH  
02:05 17 chemistries contained within that.

02:05 18 Q. On the issue of potential biological effects side, did  
02:06 19 both of you use a toxicity threshold to analyze whether the  
02:06 20 data would be harmful --

02:06 21 A. We did.

02:06 22 Q. -- I mean that the results would be?

02:06 23 A. We did. We both used a threshold.

02:06 24 Q. What toxicity threshold did you use?

02:06 25 A. I was using the toxicity threshold that was derived

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02:06 1 specifically from Incardona that was .3 parts per billion PAH.

02:06 2 That's the lowest value we got that was harmful.

02:06 3 Q. And what is Dr. Shea's toxicity threshold?

02:06 4 A. He's using a modeled toxic unit model, and his toxic  
02:06 5 threshold is 1.

02:06 6 Q. Have you prepared a series of slides explaining the TU  
02:06 7 model?

02:06 8 A. I'll try.

02:06 9 MS. FIDLER: Call D-32628.

02:06 10 BY MS. FIDLER:

02:06 11 Q. What, very briefly, is the toxic unit approach?

02:06 12 A. Toxic unit approach is a -- is a modeling approach,  
02:06 13 basically. Each of the PAHs are separated out. They have a  
02:06 14 different potency. Remember I said that as you go up in  
02:06 15 structure, you're actually increasing the toxicity. So the  
02:07 16 potency is -- changes, and these are given weighting factors.

02:07 17 And at the end, you add up all the weighting factors  
02:07 18 and add up -- if it's greater than 1, then -- then it's  
02:07 19 harmful. If it's less than 1, it's thought to be safe.

02:07 20 Q. And what was the intended purpose of the toxic unit  
02:07 21 approach?

02:07 22 A. Well, the intended purpose is that it's a screening  
02:07 23 procedure, and that the toxic units add up based on the  
02:07 24 composition assigned weights. And if it adds up to greater  
02:07 25 than 1, then it's supposed to stimulate or trigger a site or

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02:07 1 species-specific analysis.

02:07 2 Q. Are there limitations to the TU approach?

02:07 3 A. There are.

02:07 4 MS. FIDLER: Please call the next slide, D-32629.

02:07 5 BY MS. FIDLER:

02:07 6 Q. What are the limitations of the TU approach?

02:07 7 A. Primarily, the toxic unit approach is based primarily on  
02:07 8 modeling coming out of a series of acute bioassays, acute  
02:07 9 toxicity studies. And the mechanism here is the acute toxicity  
02:08 10 or narcosis mechanism. That's the -- that's the basis for it.

02:08 11 And if your goal is to assess acute toxicity, then  
02:08 12 actually this toxic unit approach is -- is relatively valid.  
02:08 13 The EPA scientists, however, that developed this recognized  
02:08 14 that the toxic unit approach might be underprotective for other  
02:08 15 toxicity mechanisms. Remember I talked about there's a series  
02:08 16 of mechanisms, acute toxicity, then chronic toxicity.

02:08 17 In the case of the embryos, for example, the neural  
02:08 18 part has not kicked in yet, so you can't have an acute narcosis  
02:08 19 toxicity for them. So trying to adapt this down to the chronic  
02:08 20 toxicity was a limitation. They've recognized this. They have  
02:08 21 some chronic toxicity tests within -- within the modeling, but  
02:09 22 they're very limited.

02:09 23 They're very limited in the number, they're very  
02:09 24 limited in the species, very limited in the number of pure  
02:09 25 compounds they use. They don't use very many. They're very

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02:09 1 limited in the number of life stages. There's only a few  
02:09 2 that -- a few fish species, for example, that have embryo  
02:09 3 information in it. And most importantly, they're very limited  
02:09 4 in the toxicity mechanisms that they're measuring and  
02:09 5 quantifying in those tests.

02:09 6 So consequently, this adds quite a few layers, so to  
02:09 7 speak, of uncertainty when you're trying to adapt this toxic  
02:09 8 unit approach to a chronic-type situation, chronic-type test.  
02:09 9 And for me, that is why this is still a screening tool,  
02:09 10 particularly at the chronic toxicity level.

02:09 11 Q. Moving to your criticism that Dr. Shea inappropriately  
02:09 12 used this TU model. I'd like to call the next slide,  
02:09 13 D-32630-A.

02:09 14 **BY MS. FIDLER:**

02:09 15 Q. What is your criticism of Dr. Shea's use of this model?

02:10 16 A. Well, basically, I don't find it as safe. Again, I said  
02:10 17 it's relatively okay for predicting an acute narcosis, but when  
02:10 18 we get down to the embryos and other toxicity mechanisms,  
02:10 19 chronic toxicity, I just don't think it's a safe way to go.

02:10 20 So the first bullet here says that Dr. Shea ignored  
02:10 21 the requirement where if you get a toxic unit greater than 1,  
02:10 22 for example, that you're going to stimulate a site or  
02:10 23 species-specific investigation. He hasn't done that.

02:10 24 The second bullet refers to this diagram I have here,  
02:10 25 a bioassay, an embryo test for Pompano coming out of BP's

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02:10 1 exposure tests that they have. And if we look at the details  
02:10 2 of this -- and I draw your attention to this group of animals  
02:10 3 here.

02:10 4 The people that conducted the tests identified those  
02:10 5 as being significantly different than the -- than the controls,  
02:11 6 and so they're circled in red. This is their assessment that  
02:11 7 it's significant.

02:11 8 I've also got a line drawn here right in the middle  
02:11 9 where the toxic units are calculated at 1. So here you see,  
02:11 10 when you average these three together, you get an average  
02:11 11 mortality of about 30 percent. And that's mortality. That's  
02:11 12 not effects or edema or growth or some other sublethal effect;  
02:11 13 it's mortality.

02:11 14 So here you have 30 percent mortality, and it's  
02:11 15 coming out at a toxic unit of about, say, .8, roughly. So  
02:11 16 right here is an example. It's just one -- one example. It's  
02:11 17 an example where the toxic unit approach of 1 is not safe for  
02:11 18 that type of assay chronic test, if you will, on an embryo  
02:11 19 test.

02:11 20 Q. Your slide mentions there was also a test on amphipods.  
02:12 21 Was that a water or a sediment test?

02:12 22 A. That was a sediment test.

02:12 23 Q. And where was the sediment coming from?

02:12 24 A. The sediment was coming from -- sediment was taken at  
02:12 25 depths in the Gulf after the spill.

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02:12 1 Q. So would your concerns about Dr. Shea's use of the TU  
02:12 2 model to assess potential harm also apply to Dr. Shea's  
02:12 3 analysis of harm from sediment exposure based on the same  
02:12 4 threshold?

02:12 5 A. It would. In this case the amphipod TU is quite low, much  
02:12 6 lower than 1.

02:12 7 And I didn't look at a lot of these. I just looked  
02:12 8 at a couple. And this is one example that it wasn't safe -- it  
02:12 9 wasn't a prediction of safe.

02:12 10 Q. I'd like to turn to your final criticism that Dr. Shea's  
02:12 11 water chemistry analyses dilutes -- dilutes the potential for  
02:12 12 harm. Have you highlighted four examples of this?

02:12 13 A. I have.

02:12 14 MS. FIDLER: Please call D-32632.

02:12 15 BY MS. FIDLER:

02:12 16 Q. Can you please explain this slide?

02:12 17 A. Well, what Dr. Shea has done here is he's treated this  
02:13 18 18,000-sample database as one large pool of samples, and he's  
02:13 19 averaged them across time, space, and depth.

02:13 20 Let's look at the mapping right here, for example.  
02:13 21 So the first thing I see is that these are samples from May of  
02:13 22 2010 to July 2012. Well, for the water samples and after the  
02:13 23 well is capped, we just wouldn't expect much toxicity, of  
02:13 24 course, showing in the water samples collected in 2011 or 2012,  
02:13 25 and yet these are averaged in.

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02:13 1           Secondly, let's go to space, meaning geography here.  
02:13 2 Look at all the samples that are collected on the inside and  
02:13 3 the outside coast of Florida. These are great samples to have  
02:13 4 taken for baseline measurements in case that slick had been  
02:13 5 swept over and impacted the coast of Florida, but that didn't  
02:13 6 happen. And yet these samples now are rolled into the database  
02:14 7 in order to calculate out the probability of -- of being there.

02:14 8           Lastly, is depth. He's averaged in in this  
02:14 9 particular case the sample -- all the samples at all depths.  
02:14 10 If we look at just one dot, let's take one sampling location.  
02:14 11 What that is is a sample taken near the surface water, at  
02:14 12 2 meters, maybe, a deeper sample, let's say 10 meters, maybe  
02:14 13 50, and then 200 and 1,000. So all these samples are rolled  
02:14 14 in, and yet we wouldn't expect significant oil concentrations  
02:14 15 in many of these samples.

02:14 16           And the net result that Dr. Shea gets is that if you  
02:14 17 look there in that pie wedge, looking at just the chronic  
02:14 18 benchmarks, he's getting a little less than 2 percent of them  
02:14 19 are toxic. He's saying that 98 percent of the samples are  
02:15 20 safe. And to me he's not using the right approach here.

02:15 21           **MS. FIDLER:** Call the next example, 326 --  
02:15 22 D-32633.2-A.

02:15 23 **BY MS. FIDLER:**

02:15 24 **Q.** Can you please explain your criticisms with regard to  
02:15 25 Dr. Shea's analysis of surface water?

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02:15 1 A. This is the surface water. And if you read the title  
02:15 2 there, this is the probability of unsafe water in May of 2010.

02:15 3 This is an important month, May of 2010. The spill,  
02:15 4 of course, is very active, still going on at this time. And  
02:15 5 yet when you look at how many samples are potentially toxic --  
02:15 6 and these are from the top 200 meters -- you do not get the  
02:15 7 impression that there's anything to worry about, frankly. That  
02:15 8 would be my interpretation of the slide that he's presenting.

02:15 9 And the sample's similarly small maybe or the map is  
02:15 10 large. But when you compare that result to what we've done  
02:15 11 down here in the lower graphic, we've graphed out, queried the  
02:16 12 database for the samples that are in the top 50 meters.  
02:16 13 We've -- and, again, we've separated it out by months. So this  
02:16 14 is May, so it's a comparable map. And here we have the samples  
02:16 15 that are appearing in the top 50 meters that have  
02:16 16 concentrations at various levels.

02:16 17 So if we were to use yellow, for example, this is a  
02:16 18 .3, and then you got the higher concentrations in the reds and  
02:16 19 orange. And you certainly see a lot more samples, for example,  
02:16 20 in those waters, all within the footprint, for the most part;  
02:16 21 but still you get the impression that there's more to worry  
02:16 22 about from that slide than you do from Dr. Shea's analysis.

02:16 23 **MS. FIDLER:** And taking a look at the analysis on the  
02:16 24 deepwater side, please call the next slide, D-32634-B.

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02:16 1 **BY MS. FIDLER:**

02:16 2 **Q.** Please explain your criticism with regard to Dr. Shea's  
02:16 3 analysis of deepwater.

02:16 4 **A.** Well, he's included this slide. There's the wellhead, but  
02:17 5 you see no samples that are identified from the plume. The  
02:17 6 deep sea plume just doesn't appear.

02:17 7 In the lower half of the slide -- excuse me. In the  
02:17 8 lower half of the slide, I've taken a slide out of -- a picture  
02:17 9 out of the Joint Analysis report that tracked the plume for  
10 several months.

02:17 11 And, of course, you see samples down there. The  
02:17 12 concentrations are not fair to compare because they're not  
02:17 13 PAHs, so we can't quite compare them to the top graph. But  
02:17 14 nevertheless, the plume was identified -- the next slide shows  
02:17 15 that it's identified by Camilli. For example, for  
02:17 16 35 kilometers out, there's plume samples that are identified  
02:17 17 out. Those oxygen levels certainly plume out. I didn't show  
02:17 18 you this, but the -- the oxygen levels are depressed there.

02:17 19 There's concentrations out of the database that are  
02:17 20 at 100 parts per billion and greater. That's 100 parts per  
02:18 21 billion. Certainly, there has to be some samples that would be  
02:18 22 cause for concern -- toxic concern, and yet there's nothing  
02:18 23 appearing in Dr. Shea's analysis.

02:18 24 **Q.** And turning to your final slide, Dr. Rice, have you  
02:18 25 prepared a rebuttal to these analyses?

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02:18 1 A. I have.

02:18 2 MS. FIDLER: Call D-32635.

02:18 3 BY MS. FIDLER:

02:18 4 Q. What is your response to Shea's -- Dr. Shea's analysis?

02:18 5 A. Well, I guess, briefly, I would want to look for where you  
02:18 6 might suspect that there would be PAH. So when we did this  
02:18 7 analysis here, we were looking primarily offshore. We've  
02:18 8 broken it out by month, because we wanted to know what -- what  
02:18 9 times of the year following the spill would you expect maybe  
02:18 10 to -- to find the oil, to be comparable to the species of  
02:18 11 concern, meaning those embryos that Incardona and Mager are  
02:18 12 studying.

02:18 13 We restricted our analysis to the top 2 meters. So  
02:18 14 the -- the blue bar here in the month of May, June, July,  
02:19 15 that's just the top 2 meters.

02:19 16 The intermediate level, we don't expect much, so that  
02:19 17 sector goes from 2 meters down to 1,000. And then we want to  
02:19 18 separate out, of course, the deepwater samples that are  
02:19 19 1,000 meters or deeper.

02:19 20 And my interpretation from this slide is -- we have  
02:19 21 three critical months that are significantly greater, May,  
02:19 22 June, July, compared to August, September, October, et cetera.

02:19 23 The blue -- the highest bars, or the blue bars, so  
02:19 24 those are the samples of the top 2 meters. And if you look at  
02:19 25 the red here -- 59 percent of the samples in May, 72 percent of

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02:19 1 the samples in June, 30 percent of the samples in July -- out  
02:19 2 of the top 2 meters are above .3 parts per million, the  
02:19 3 threshold that I was using from the Incardona study.

02:19 4 If you use the -- look at the deep samples here,  
02:19 5 they're a little bit lower, but they're still quite  
02:19 6 significant. Almost half the samples in May are above .3 parts  
02:20 7 per billion. I'm starting to get concerned at those levels.

02:20 8 It does drop off in June and July. But at least  
02:20 9 there's some evidence -- significant evidence, in my mind, that  
02:20 10 there's a potential for toxic harm coming from these samples.  
02:20 11 And it's -- it's just quite different than what Shea shows.

02:20 12 Q. And, Dr. Rice, do these toxicity patterns you've  
02:20 13 identified at the .3 part per billion toxicity threshold, do  
02:20 14 those same patterns play out at other toxicity thresholds?

02:20 15 A. They would. It would be the same exact pattern. If we  
02:20 16 were to drop it down to 1 part per billion, which is what I  
02:20 17 showed in that other slide that corresponds to mine, it would  
02:20 18 be right here at 40 percent. So even in the month of May,  
02:20 19 40 percent of those samples would be toxic to a mahi-mahi  
02:20 20 embryo, for example, in the top 2 meters.

02:20 21 Q. And are those analyses also set forth in Appendix B?

02:20 22 A. They are.

02:21 23 MS. FIDLER: Thank you, Dr. Rice.

02:21 24 I have no further questions at this time.

02:21 25 THE COURT: All right. Ms. Karis.

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02:21 1 MS. KARIS: Your Honor, would you like me to proceed  
02:21 2 now, or I wasn't sure if you wanted to take a --

02:21 3 THE COURT: I'm sorry, what?

02:21 4 MS. KARIS: I'm sorry. Have me proceed now, or did  
02:21 5 you want to take our afternoon break?

02:21 6 THE COURT: No, not unless we -- someone needs it.  
02:21 7 But otherwise, we'll go a little bit longer.

02:21 8 MS. KARIS: Okay.

02:21 9 THE COURT: I thought we'd break somewhere between  
02:21 10 3:00 or 3:30.

02:21 11 MS. KARIS: Okay. Thank you.

02:22 12 Your Honor, may I proceed?

02:22 13 THE COURT: Sure.

02:22 14 MS. KARIS: Thank you.

02:22 15 For the record, Hariklia Karis.

02:22 16 And, Dr. Rice, I have you on cross-examination.

02:22 17 **CROSS-EXAMINATION**

02:22 18 **BY MS. KARIS:**

02:22 19 Q. Dr. Rice, I believe you testified, amongst the materials  
02:22 20 you considered, to use your words, most importantly, the water  
02:22 21 chemistry samples that existed for the *Deepwater Horizon* --  
02:22 22 arising from the *Deepwater Horizon* environmental investigation;  
02:23 23 correct?

02:23 24 A. That's true.

02:23 25 Q. Okay. And you said it was most importantly the water

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02:23 1 chemistry samples. But to be clear, at the time you issued  
02:23 2 your Round 1 report, you had not reviewed that water chemistry  
02:23 3 data; correct?

02:23 4 A. That's correct. I was using peer-reviewed literature that  
02:23 5 recorded some of those doses, but I did not analyze the  
02:23 6 18,000-sample database until after the comments came from  
02:23 7 Dr. Shea.

02:23 8 Q. Okay. And we'll get back to that most important water  
02:23 9 chemistry data and the literature that you reviewed.

02:23 10 But you would agree with me that the water samples  
02:23 11 that were collected as part of the *Deepwater Horizon*  
02:23 12 environmental investigation following the *Deepwater Horizon*  
02:23 13 spill was quite extensive in terms of size and scope?

02:23 14 A. It was quite extensive, yes. More than any other spill  
02:24 15 I've ever seen.

02:24 16 Q. And you would agree that those samples were collected  
02:24 17 under good quality control assurance protocols; correct?

02:24 18 A. Well, I have to assume that. And the reason why I'm  
02:24 19 assuming that is because this database has not been  
02:24 20 peer-reviewed and I haven't seen the synthesis, for example,  
02:24 21 coming out from the people that gathered the data, gathered the  
02:24 22 samples, did the analyses. So I have to trust that everything  
02:24 23 in there is pretty good.

02:24 24 Q. And you have, in fact, trusted everything there is pretty  
02:24 25 good because you put together those charts that showed us where

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02:24 1 you expected to see potential injury based on that water  
02:24 2 chemistry data; correct?

02:24 3 A. That's true.

02:24 4 Q. Okay. Now, you considered that water chemistry data to be  
02:24 5 reliable; correct?

02:24 6 A. Well, again, with one caveat, that it hasn't been  
02:24 7 peer-reviewed, that it hasn't been synthesized by the people  
02:25 8 that took the data. You know, will they ever eliminate some  
02:25 9 data, for example? It's hard for me to believe that  
02:25 10 100 percent of those samples are spot on. But I don't know  
02:25 11 that.

02:25 12 Q. But in rendering your opinions in this case, as they  
02:25 13 pertain to that data -- because your Round 2 reports have such  
02:25 14 opinions as well as your Round 3 report -- you considered that  
02:25 15 data to be reliable; correct?

02:25 16 A. I did.

02:25 17 Q. Thank you.

02:25 18 Sitting here today, you have no reason to disagree  
02:25 19 with any of that water chemistry data after you considered  
02:25 20 whatever information about it you've reviewed to date; correct?

02:25 21 A. Given the caveat that I've been giving, yes.

02:25 22 Q. Okay. And you definitely agree that the water chemistry  
02:25 23 data is of sufficient quantity to analyze; correct?

02:25 24 A. I did not quite say that.

02:25 25 Q. Okay.

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02:25 1 A. What I said is this is the most samples that I've ever  
02:25 2 seen in a spill. But sufficient, that's a little bit  
02:26 3 different. I would have liked to have had -- being a  
02:26 4 scientist, I would like to have had more samples. I would like  
02:26 5 to have had more directed samples, for example.

02:26 6 Q. Doctor -- I'm sorry.

02:26 7 A. And all those samplings are still just single snapshots in  
02:26 8 time.

02:26 9           What I mean by that is if I was to go back to some  
02:26 10 location and sample the next day and sample the next day, I  
02:26 11 really don't know what I would get, because those are just  
02:26 12 snapshots in time.

02:26 13 Q. Dr. Rice, you agree that the water chemistry data is of  
02:26 14 sufficient quantity, quote, to support your conclusions, end  
02:26 15 quote; correct?

02:26 16 A. Well, yes --

02:26 17 Q. Thank you.

02:26 18 A. -- with the caveat that I gave you.

02:26 19 Q. You're aware that the government has analyzed a large  
02:26 20 portion of this data; correct?

02:26 21 A. Correct.

02:26 22 Q. And you're familiar with the Unified Command's Operational  
02:26 23 Science Advisory Team for the federal on-scene coordinator,  
02:27 24 what is often referred to as OSAT?

02:27 25 A. No, not really.

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02:27 1 Q. Okay.

02:27 2 MS. KARIS: Let's pull up TREX-12237.1, please.

02:27 3 Exhibit -- I'm sorry, TREX-12237.1.

02:27 4 BY MS. KARIS:

02:27 5 Q. You're familiar with this document which is regarding the  
02:27 6 sampling and monitoring data that has been collected and  
02:27 7 analyzed by the government, OSAT in particular; correct?

02:27 8 A. Yes.

02:27 9 Q. Thank you.

02:27 10 This report, as is shown on the bottom there, is  
02:27 11 dated December 17th of 2010?

02:27 12 A. Correct.

02:27 13 Q. That's when it was first issued; correct?

02:27 14 A. Correct. That's the date.

02:27 15 MS. KARIS: And if we can now go to TREX-12237.28.1.

02:28 16 BY MS. KARIS:

02:28 17 Q. Table 3.1 from the OSAT report contains the data that the  
02:28 18 government scientists collected and analyzed for the nearshore  
02:28 19 environment; correct? Do you see at the top there it says,  
02:28 20 "3.1, Summary of water and sediment analytical chemistry  
02:28 21 results in the nearshore zone"?

02:28 22 A. That's what it says.

02:28 23 Q. "Data sets were compared to human health benchmarks" -- we  
02:28 24 talked about those yesterday -- "aquatic life benchmarks,"  
02:28 25 which is what you're talking about here today, "and dispersant



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02:28 1 screening levels. For each benchmark (or screening level),  
02:28 2 total number of samples that were nondetect, below benchmark,  
02:28 3 or exceeded benchmarks were computed."

02:28 4 And they were computed by OSAT; correct?

02:28 5 A. That's what it says.

02:28 6 Q. "The total number of samples is not the same for the human  
02:29 7 health, aquatic life, or dispersant categories because not all  
02:29 8 sample were analyzed for all analytes."

02:29 9 And if we look here, we can see the samples collected  
02:29 10 for aquatic life and for dispersants; correct? Collected and  
02:29 11 analyzed; correct?

02:29 12 A. Yes.

02:29 13 MS. KARIS: Next slide, please.

02:29 14 BY MS. KARIS:

02:29 15 Q. For aquatic life, the total number of samples collected  
02:29 16 were 6,909; correct?

02:29 17 A. That's what it says.

02:29 18 Q. If you can go back -- I'm sorry.

02:29 19 And what we see is of those 6,909 samples, 5,337 had  
02:29 20 nondetects, 395 were below benchmarks, correct, again, for the  
02:30 21 water samples?

02:30 22 A. Correct.

02:30 23 Q. And then we have exceed benchmark, and you see here at the  
02:30 24 bottom where it says: "The number in parentheses refers to  
02:30 25 exceedances consistent with MC252 oil or indeterminate."

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02:30 1 Do you see that?

02:30 2 A. I see that.

02:30 3 Q. So from these 6,000 samples -- 6,909 samples for water  
02:30 4 column -- actually, they're not all water column samples, to be  
02:30 5 clear -- these approximately 6,000 samples, 22 refer to  
02:30 6 exceedances for MC252 oil; correct?

02:30 7 A. That's what I read, yes.

02:30 8 Q. Okay. Now, you understand that "exceed benchmarks" -- you  
02:31 9 understand what that means; right?

02:31 10 A. Probably. I'm guessing -- because I haven't read this  
02:31 11 document recently. I'm assuming that that means that it  
02:31 12 exceeds the EPA benchmarks.

02:31 13 Q. Those would be the EPA's benchmarks for aquatic life;  
02:31 14 correct?

02:31 15 A. The EPA benchmarks based on toxic units, yes.

02:31 16 Q. Okay. And that was for nearshore. Now, let's look at  
02:31 17 deepwater zone.

02:31 18 TREX-12237.43.1, again, from the OSAT report, a  
02:31 19 "Summary of the water and sediment analytical chemistry results  
02:31 20 in the deepwater zone."

02:31 21 Does this report the results from aquatic life as  
02:32 22 2,721 samples were nondetects; correct?

02:32 23 A. Yes.

02:32 24 Q. And below benchmark, 821 of those samples were below the  
02:32 25 EPA's benchmarks; correct?

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02:32 1 A. That's how it reads.

02:32 2 Q. And, again, for the deepwater zone, exceed benchmarks, the  
02:32 3 number inside the parentheses, which is consistent with MC252  
02:32 4 oil, is 63 samples; correct?

02:32 5 A. That's what it says.

02:32 6 Q. So this would have been data that was collected in 2010  
02:32 7 showed that there were 63 exceedances of benchmarks of  
02:32 8 approximately 3,500 samples, if we take out the sediment  
02:32 9 collection; correct?

02:32 10 A. Correct.

02:33 11 Q. And, in fact, OSAT reports on the percent of exceedances  
02:33 12 for water column and sediment as being 2 percent; correct?

02:33 13 A. That's the value that's in that box.

02:33 14 Q. Now, I haven't asked you about sediment samples. You're  
02:33 15 aware that there were thousands of sediment samples collected;  
02:33 16 correct?

02:33 17 A. I'm aware. I did not analyze the sediments very  
02:33 18 extensively. I relied on the peer-reviewed literature that I  
02:33 19 was reading.

02:33 20 Q. In fact, you didn't analyze the sediment samples that were  
02:33 21 collected at all; correct?

02:33 22 A. I did not have the time to do that, no.

02:33 23 Q. So when Dr. Boesch testified earlier today that he relied  
02:33 24 on your analysis of the sediments samples, you did not do any  
02:33 25 such analysis; correct?

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02:33 1 A. Well, that's not quite what I said. I didn't analyze that  
02:33 2 database, the 18,000-sample database. I did certainly read and  
02:33 3 review several papers, the Turner paper being a prime example,  
02:34 4 the most recent paper showing extensive PAH in the wetlands,  
02:34 5 and the series of samples with baselines prior to the spill.

02:34 6 Q. So to be accurate, then, you reviewed peer-reviewed  
02:34 7 literature, some of which referenced sediment samples; correct?

02:34 8 A. Correct.

02:34 9 Q. You did not, though, go and review or analyze the sediment  
02:34 10 samples referenced in that peer-reviewed literature; correct?

02:34 11 A. No, I did not.

02:34 12 Q. My statement is correct then? I'm sorry, I think we have  
02:34 13 a double negative, for the record.

02:34 14 You have not reviewed any sediment samples, even of  
02:34 15 the peer-reviewed literature that you looked at; correct?

02:34 16 A. Again, I've reviewed peer-reviewed literature.

02:34 17 Q. Okay. Thank you.

02:34 18 Now, OSAT, after reviewing those sediment samples and  
02:34 19 analyzing them both for nearshore and deepshore made certain  
02:34 20 key findings. You're aware of that, in that report issued in  
02:35 21 December of 2010; correct?

02:35 22 A. Actually, I'm not aware, no.

02:35 23 MS. KARIS: Okay. Let's look at it. TREX-12237.6.1.

02:35 24 BY MS. KARIS:

02:35 25 Q. OSAT found in December of 2010 that there were no

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02:35 1 exceedances of EPA's dispersant benchmark -- I'm sorry. Let me  
02:35 2 read it again.

02:35 3 "Key Findings. No exceedances of EPA's dispersant  
02:35 4 benchmarks were observed."

02:35 5 You were not aware of that? Is that your testimony?

02:35 6 A. I'm not aware of the details in this document, no.

02:35 7 Q. Including its key findings; correct?

02:35 8 A. Correct. Again, these benchmarks are benchmarks. This is  
02:35 9 a screening tool. I relied on the peer-reviewed literature  
02:35 10 more than I relied on this.

02:35 11 Q. You did not rely on EPA's benchmarks?

02:35 12 A. I did not. It's a screening tool. I was looking to  
02:36 13 review the peer-reviewed literature that was peer-reviewed.

02:36 14 Q. We'll talk about the peer-reviewed literature. But you're  
02:36 15 aware that Dr. Shea, he did rely on these EPA benchmarks;  
02:36 16 correct?

02:36 17 A. Correct.

02:36 18 Q. Thank you.

02:36 19 Now, let's look at another key finding from OSAT 1.

02:36 20 **MS. KARIS:** TREX-12237.6.2, please.

02:36 21 **BY MS. KARIS:**

02:36 22 Q. Were you aware that in the OSAT report, they made a key  
02:36 23 finding, Number 4, "Since 3 August 2010, less than 1 percent of  
02:36 24 water samples and approximately 1 percent of sediment samples  
02:36 25 exceeded EPA's aquatic life benchmarks for" polycyclic

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02:36 1 aromatic -- aromatic hydrocarbons, "PAH"?

02:36 2 Were you aware of that?

02:36 3 A. No.

02:36 4 Q. They went on to say: "Analysis of individual samples  
02:36 5 indicated that none of the water sample exceedances were  
02:36 6 consistent with MC252."

02:36 7 You were not aware of that; correct?

02:37 8 A. Are these all -- I can't tell the context. Are all these  
02:37 9 nearshore?

02:37 10 Q. These are the key findings from the nearshore and  
02:37 11 offshore.

02:37 12 A. Okay.

02:37 13 Q. You were not aware of that fact, that none of the water  
02:37 14 samples exceeded the MC252 benchmarks; correct?

02:37 15 A. Again, the benchmarks, I agree. I am not aware -- I did  
02:37 16 not pay attention to the benchmarks.

02:37 17 Q. And of the sediment exceedances, only these within  
02:37 18 3 kilometers of the wellhead were consistent with MC252. And,  
02:37 19 again, that would be the sediment -- sediment samples that you  
02:37 20 did not review; correct?

02:37 21 A. That's what -- that's how it reads.

02:37 22 Q. Now, you referenced that in your report, you relied on  
02:37 23 peer-reviewed literature, certainly your Round 1 report, and  
02:38 24 you only looked at the water chemistry samples after you got  
02:38 25 Dr. Shea's first-round report; correct?

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02:38 1 A. That's correct.

02:38 2 Q. Now, at the time of your deposition, as you indicated, it  
02:38 3 was brought to your attention that there were some errors in  
02:38 4 your Round 2 report; correct?

02:38 5 A. That's correct.

02:38 6 Q. And your Round 2 report errors pertained to your review of  
02:38 7 some of the chemistry data that we've just been talking about;  
02:38 8 correct?

02:38 9 A. Correct.

02:38 10 Q. And it also pertained -- I'm sorry, then you issued a --  
02:38 11 you had a Round 3 report that also had some mistakes; correct?

02:38 12 A. Correct.

02:38 13 Q. And, again, that was brought to your attention at your  
02:38 14 deposition; correct?

02:38 15 A. Correct.

02:38 16 Q. And to be fair, Mr. Israel brought those -- BP's counsel  
02:38 17 brought those errors to your attention during your deposition;  
02:38 18 correct?

02:38 19 A. That's correct.

02:39 20 Q. Now, before issuing your reports, you made sure -- strike  
02:39 21 that.

02:39 22 Before issuing your reports, you made every effort in  
02:39 23 your review to ensure that your reports were accurate?

02:39 24 A. That's true.

02:39 25 Q. And after those -- those errors were brought to your

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02:39 1 attention, you issued some corrections?

02:39 2 A. Correct.

02:39 3 Q. In December of this year; correct?

02:39 4 A. Correct.

02:39 5 Q. And then you found more mistakes and you issued another  
02:39 6 round of corrections in January of this year; correct?

02:39 7 A. I thought -- I thought the corrections in December were --  
02:39 8 I'd have to look at the dates. I thought the December -- the  
02:39 9 corrections in December were it.

02:39 10 Q. Sitting here now, do you know whether we were given yet  
02:39 11 more corrections to your report, including to Figure 6 in  
02:39 12 January of this year?

02:39 13 A. Without seeing the documents again and the dates --

02:40 14 MS. FIDLER: Objection, Your Honor. What happened is  
02:40 15 Dr. Rice redacted that, redacted that figure from the appendix.  
02:40 16 And it's -- as is set forth in the briefing on this issue.

02:40 17 MS. KARIS: It's after -- I'm happy to follow up --

02:40 18 MS. FIDLER: So he's withdrawn -- he's withdrawn that  
02:40 19 figure entirely.

02:40 20 BY MS. KARIS:

02:40 21 Q. Dr. Rice, why did you withdraw Figure 6 from your report  
02:40 22 in January of this year after you made your corrections in  
02:40 23 December?

02:40 24 A. Right now, I do not remember what Figure 6 is. I'd have  
02:40 25 to see it.



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02:40 1 Q. All right. We'll pull it up shortly. But were you aware  
02:40 2 that one of the figures from your report has been withdrawn?

02:40 3 A. I remember that now.

02:40 4 Q. And regardless of when it happened, do you know why you  
02:40 5 withdrew it?

02:40 6 A. I'd have to see the figure.

02:40 7 Q. Okay. Now, let's look at TREX-13331.33.1.

02:41 8 You testified on direct examination that the  
02:41 9 corrections to your tables were the result of some  
02:41 10 miscalculations or computing errors; is that correct?

02:41 11 A. Well, yes. But not computing errors, I think sorting  
02:41 12 errors would be the more appropriate way to describe it.  
02:41 13 18,000-sample database, that's two and a half million records.  
02:41 14 So it's a very large database. I'm not experienced enough to  
02:41 15 sort that sort of database that large. I could ask questions  
02:41 16 and I could interpret data once it's sorted.

02:41 17 But -- so anyway, what we did there is we -- we had  
02:41 18 trouble matching Dr. Shea's analysis because of the large  
02:41 19 samples. So the correction between Round 2 and 3 was there is  
02:42 20 a thousand samples that we couldn't account for that were in  
02:42 21 the database. So those are ultimately found and that  
02:42 22 correction was made for the Round 3 report.

02:42 23 Then we're still off by -- well, as this particular  
02:42 24 figure shows, we have got deep samples in the nearshore. Well,  
02:42 25 there are no deep samples in the nearshore. So that was

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02:42 1 pointed out by -- by your colleague there.

02:42 2 Q. That -- I'm sorry. Just one second. For the record --

02:42 3 MS. FIDLER: Objection, Your Honor. He wasn't  
02:42 4 finished answering the question.

02:42 5 MS. KARIS: Your Honor, I was just going to point  
02:42 6 to --

02:42 7 THE COURT: Well, why don't you let him finish  
02:42 8 answering first --

02:42 9 MS. KARIS: Sure.

02:42 10 THE COURT: -- and then you can do that. Okay?

02:42 11 MS. KARIS: Sure.

02:42 12 BY MS. KARIS:

02:42 13 Q. Go ahead.

02:42 14 A. So as I just stated, there were no nearshore samples. So  
02:42 15 that indicated that we had had sample data and location data  
02:42 16 mismatched. And that's true, we did.

02:42 17 So in the Round 3 report, an error -- a correction, I  
02:42 18 should say, we've corrected the data. That didn't change the  
02:42 19 number of samples, it didn't change the number of toxic samples  
02:43 20 we found; but it certainly changed the location where they  
02:43 21 belonged. So these deep samples obviously belong offshore,  
02:43 22 which is where we put them. So it just changed the  
02:43 23 categorizing or the sorting.

02:43 24 Q. Who was doing the analysis of this data?

02:43 25 A. My colleague, Mark Carls, was, that I've worked with since

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02:43 1 approximately 1980, about 30 years or so.

02:43 2 Q. All right. And we'll come back to Mr. Carls -- Dr. Carls.  
02:43 3 You've published with him, including in some of the  
02:43 4 peer-reviewed literature that you rely on for your opinions in  
02:43 5 this case; correct?

02:43 6 A. I have published a number of papers with him, yes.

02:43 7 Q. And was -- I'm sorry. Was it -- is it Dr. Carls who  
02:43 8 identified on your graph here a deep nearshore?

02:43 9 A. Correct, he did that.

02:43 10 Q. There is no such thing, as you pointed out, as a deep  
02:43 11 nearshore?

02:43 12 A. Right. That's --

02:43 13 Q. Because -- I'm sorry. One second.

02:43 14 Because here it says --

02:43 15 A. Yeah, because we had the mismatching location and depth  
02:43 16 that I just described.

02:43 17 Q. Okay. Now, if -- so that's one mistake. Then we had the  
02:44 18 mismatching that you identified.

02:44 19 If we can now go to TREN-13332.36.1.

02:44 20 And, again, now this is from your Round 3 report  
02:44 21 after you made some corrections; correct?

02:44 22 A. Between Round 2 and 3, we had about a thousand samples  
02:44 23 that we couldn't account for. I don't remember the precise  
02:44 24 number. They match up with Dr. Shea's. So we found those,  
02:44 25 they were resorted, and we produced this graphic for Round 3,

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02:44 1 which is the errors -- the depth location errors were  
02:44 2 mischaracterized.

02:44 3 Q. Okay. So you found some mistakes and you corrected those  
02:44 4 mistakes in Round 3, but you still have deep nearshore here;  
02:44 5 correct?

02:44 6 A. In Round 3, we still had not corrected, at this time, the  
02:45 7 deep nearshore corrections. That wasn't found between Round 2  
02:45 8 and 3.

02:45 9 Q. Now --

02:45 10 A. It's a thousand samples that we had done -- couldn't find  
02:45 11 that were buried in that 18,000, two-and-a-half-million-record  
02:45 12 database.

02:45 13 Q. Okay. Now, here, May -- first of all, these numbers under  
02:45 14 here, what do they indicate?

02:45 15 A. They indicate the number of samples. And, obviously, it's  
02:45 16 hard to have two bars with a sample of one. So, again, this is  
02:45 17 part of the mismatching and error corrections that we didn't  
02:45 18 catch in time.

02:45 19 Q. Okay. So for May here, you have one sample, but you have  
02:45 20 that one sample with two bars being a -- an intermediate  
02:45 21 nearshore and then another for surface nearshore with different  
02:45 22 readings for one sample; correct?

02:45 23 A. Correct. This is an error and we admit we made an error  
02:45 24 in that report and they've been corrected.

02:46 25 Q. Dr. Rice, you did not perform any of the analyses yourself

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02:46 1 of the water chemistry data in your Rounds 2 or 3 reports;  
02:46 2 correct?

02:46 3 A. It's true that I did not have the capacity, the skill  
02:46 4 level to handle a sample set that has two and a half million  
02:46 5 records in it. So, no, I did not do that. I was asking the  
02:46 6 querying questions, but I did not ask the -- I could not  
02:46 7 manipulate this database. It's beyond my skill level.

02:46 8 Q. And you relied on Dr. Carls in performing that analysis  
02:46 9 and then forming your opinions in this case; correct?

02:46 10 A. That's correct.

02:46 11 Q. Now, we talked about the water sediment samples that were  
02:47 12 reviewed and reported in your Round 2 and Round 3 report. But  
02:47 13 your Round 3 report also contained an appendix that identified  
02:47 14 the studies that you contend corroborate your opinions in this  
02:47 15 case; correct?

02:47 16 A. Correct.

02:47 17 Q. And that's the peer-reviewed literature that you told us  
02:47 18 you looked at and relied on in reaching your opinions here;  
02:47 19 correct?

02:47 20 A. Correct.

02:47 21 Q. And I believe you testified on direct very early on that  
02:47 22 even with Appendix C, you identified some errors and you  
02:47 23 corrected those errors in December of this year; correct?

02:47 24 A. Correct. There was one paper, a paper by Incardona where  
02:47 25 we had misidentified two species, one was the bluefin tuna. We

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02:47 1 had identified the target species, so to speak, the Gulf  
02:47 2 species when, in fact, he had done the work on a southern  
02:48 3 bluefin tuna because that is the -- is the specific bluefin  
02:48 4 tuna that was being cultured, and he had access to the embryos.

02:48 5 Q. Okay.

02:48 6 A. And we --

02:48 7 Q. So we're going to talk about the Incardona study at  
02:48 8 length, I think, hopefully not too long. But Incardona studies  
02:48 9 three species; correct?

02:48 10 A. Three species, the bluefin tuna, the southern -- excuse  
02:48 11 me. Yeah, the southern bluefin tuna, also the yellowfin tuna,  
02:48 12 which is a Gulf species, and the amberjack. And he was using a  
02:48 13 cultured amberjack, very closely related, but it wasn't the  
02:48 14 Gulf species.

02:48 15 Q. And you misidentified in your report two of those three  
02:48 16 species; correct?

02:48 17 A. Right. I got the genre right; I didn't get the species  
02:48 18 quite right.

02:48 19 Q. Okay. And there was some significant differences between  
02:48 20 the species as you identified them and the species that  
02:48 21 Dr. Incardona actually studied; correct?

02:49 22 A. Well, let's take the case of the bluefin tuna. The  
02:49 23 bluefin -- the two bluefin tunas, they both have the same  
02:49 24 common name. That's because they are very, very similar;  
02:49 25 similar in morphology, similar in their embryology, similar in

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02:49 1 their value.

02:49 2 Q. All right.

02:49 3 A. It's been argued that they're actually the same species  
02:49 4 and that they're truly -- actually a subspecies of each other.  
02:49 5 But that's where the literature is right now.

02:49 6 Q. Well, the species that Incardona -- Dr. Incardona  
02:49 7 identified was which bluefin tuna?

02:49 8 A. He did his work on the southern bluefin tuna, which is in  
02:49 9 Australia and being cultured there --

02:49 10 Q. Thank you.

02:49 11 A. -- which gave him access to the embryos.

02:49 12 Q. And the Atlantic bluefin tuna which you had identified as  
02:49 13 the species, that was not studied by Dr. Incardona; correct?

02:49 14 A. That is correct.

02:49 15 Q. And you said there are similarities. But to be clear, the  
02:49 16 southern bluefin tuna does not live in the Gulf of Mexico;  
02:50 17 correct?

02:50 18 A. That's correct. It lives near Australia.

02:50 19 Q. So the species that Dr. Incardona actually studied is not  
02:50 20 found in the Gulf of Mexico with respect to tuna; correct?

02:50 21 A. No, he did not. He studied the bluefin tuna, which is  
02:50 22 very, very closely related to the Atlantic bluefin tuna.

02:50 23 Q. You've said that a couple of times. And you would agree  
02:50 24 with me that you recognize that there are different -- strike  
02:50 25 that.

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02:50 1 You recognize that different species can respond  
02:50 2 differently to the same chemicals in the same dose; correct?

02:50 3 A. Within a range, that's true. If I conducted a test ten  
02:50 4 times in a row with one species, I would expect to get very  
02:50 5 similar results, not identical. But the same would also be  
02:50 6 true if I tested ten different species that are very similar; I  
02:50 7 obviously wouldn't get the same results.

02:51 8 Q. But different species -- that is, the Atlantic bluefin  
02:51 9 tuna -- can have different responses to the same exposure of  
02:51 10 the same chemicals in the same dose than the southern bluefin  
02:51 11 tuna; correct?

02:51 12 A. Well, I would expect that the responses would be  
02:51 13 identical. The dose level might be slightly different, but  
02:51 14 when we look at a wide range of species -- and I mentioned this  
02:51 15 in my direct, pink salmon which, of course, is very, very --

02:51 16 Q. We're talking about bluefin tuna --

02:51 17 MS. FIDLER: Objection, Your Honor. He wasn't  
02:51 18 finished answering.

02:51 19 THE WITNESS: I was demonstrating a point --

02:51 20 THE COURT: Go ahead.

02:51 21 THE WITNESS: I was demonstrating the point that when  
02:51 22 you have very divergent species, you still get the same effect.  
02:51 23 The dose level -- you're right, the dose level could be  
02:51 24 somewhat different, particularly if they are a different size.  
02:51 25 These two species are not. I'm talking about the embryo.



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02:51 1 But, yeah, your point is made. You can have a  
02:51 2 quantitative response that is different than when the doses --

02:52 3 **BY MS. KARIS:**

02:52 4 **Q.** The dose level is significant in analyzing toxicity;  
02:52 5 correct?

02:52 6 **A.** Well, certainly the dose matters.

02:52 7 **Q.** Thank you.

02:52 8 And so if the dose level can be different, you would  
02:52 9 want to know how a particular species responds to a particular  
02:52 10 dose; correct?

02:52 11 **A.** Correct.

02:52 12 **Q.** Thank you.

02:52 13 Now, you made no attempt to compare the hardiness of  
02:52 14 the Gulf of Mexico tuna -- that is, the Atlantic tuna -- with  
02:52 15 the southern bluefin tuna that Dr. Incardona used in his  
02:52 16 experiment; correct?

02:52 17 **A.** Correct.

02:52 18 **Q.** You do not know the specific PAH concentrations that would  
02:52 19 cause a toxicological response to the bluefin tuna species,  
02:52 20 which is the species that actually lives -- I'm sorry, which is  
02:52 21 the species that actually lives in the Gulf of Mexico;  
02:52 22 correct -- I mean, lives in Australia, it doesn't live in the  
02:52 23 Gulf of Mexico; correct?

02:52 24 **A.** You confused me there. Could you --

02:53 25 **Q.** I'm sorry.

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02:53 1 A. -- start one more time?

02:53 2 Q. That was a very poorly worded question.

02:53 3 You agree that you don't know the specific  
02:53 4 PAH concentration that would cause a toxicological response to  
02:53 5 the Atlantic bluefin tuna embryos, those in the Gulf of Mexico?

02:53 6 A. That's correct, I do not know the precise dose that would  
02:53 7 cause the same threshold effect. I would expect it to be near  
02:53 8 that just because of the similarity of these two species,  
02:53 9 similarity in size.

02:53 10 Q. Wait. Do you recall when we asked you at your deposition  
02:53 11 whether you knew at what concentration -- at what  
02:53 12 PAH concentrations -- what PAH concentrations would cause  
02:53 13 specific toxicological responses to the Atlantic bluefin tuna,  
02:53 14 and you said you did not know?

02:53 15 A. That's correct, I did not know the precise amount. But I  
02:53 16 can have a pretty good educated guess -- a pretty good educated  
02:53 17 estimate, I should say, that the dose would be down there near  
02:54 18 a part per billion. Maybe a little bit above, maybe a little  
02:54 19 bit below, but it's going to be in that range.

02:54 20 Q. In the range, but you don't know precisely?

02:54 21 A. That's correct.

02:54 22 Q. Okay. Now, Dr. Incardona's study that you relied on,  
02:54 23 you're aware that 40 percent of the Australian bluefin tuna  
02:54 24 that he used as controls, meaning no exposure to oil, died  
02:54 25 during the experiment?

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02:54 1 A. I'm aware of that.

02:54 2 Q. The rate of mortality for control species -- that rate of  
02:54 3 mortality for control species is not common in your experience;  
02:54 4 correct?

02:54 5 A. Correct, it's not common. It's -- I've approached it at  
02:54 6 times. It's also not common to have 100 percent survival of  
02:54 7 embryos and larva. I don't know that I've ever seen a test  
02:54 8 with 100 percent survival of the controls. Embryos and larva  
02:54 9 are very, very fragile, very, very sensitive, very, very  
10 difficult to work with.

02:54 11 Q. I appreciate that you may not have 100 percent controls,  
02:54 12 but you would agree with me that a 40 percent mortality rate is  
02:55 13 not common; correct?

02:55 14 A. It is not common.

02:55 15 Q. Thank you.

02:55 16 And you have never published the results of any  
02:55 17 toxicological experiment that had a mortality rate of  
02:55 18 40 percent for control?

02:55 19 A. I published one paper, I believe, that has near that, over  
02:55 20 30 percent.

02:55 21 Q. My question was whether you've ever published anything  
02:55 22 that had a mortality rate of 40 percent for controls?

02:55 23 A. No.

02:55 24 Q. You agree that Dr. Incardona's study admittedly had  
02:55 25 complications or, to use your words, it was not perfect -- it

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02:55 1 was not a perfect test; correct?

02:55 2 A. That's correct. Very seldom do you get a perfect test  
02:55 3 with embryos and larva.

02:55 4 Q. Let's look at Dr. Incardona's study. I'm sorry. If we  
02:56 5 can pull up from the demonstrative that you were shown on  
02:56 6 direct examination with the control, D-32618-A.

02:56 7 You were shown this demonstrative on direct  
02:56 8 examination. Do you recall that?

02:56 9 A. Very definitely.

02:56 10 Q. And to be clear, this comes from the publication that you  
02:56 11 relied on to reach a conclusion that there might be threshold  
02:56 12 effects at .3 parts per billion; correct?

02:56 13 A. That's correct.

02:56 14 Q. And parts per billion of .2, that would be the dose  
02:56 15 exposure?

02:57 16 A. It's -- it's the calculated exposure that he has. He has  
02:57 17 a range of doses, and you calculate out basically where the  
02:57 18 effect begins based on the calculations.

02:57 19 Q. Now, this call-out from Dr. Incardona's study, to be  
02:57 20 clear, these oil-exposed bluefin tuna, yellowfin tuna, and  
02:57 21 yellowtail amberjack species that are shown here, none of these  
02:57 22 were at that .3 level that resulted in this graphic; correct?

02:57 23 A. To get the spinal effects, they're probably slightly  
02:57 24 higher, yes.

02:57 25 Q. And when you say "slightly higher," to be clear, the

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02:57 1 Incardona study indicates that -- sorry. For --

02:58 2 MS. KARIS: I'm sorry. Do we have the actual  
02:58 3 document? We can do this.

02:58 4 BY MS. KARIS:

02:58 5 Q. For the bluefin tuna, this is an exposure of 8.5 --

02:58 6 A. That's correct.

02:58 7 Q. -- correct?

02:58 8 That's right?

02:58 9 A. I believe that's correct. I know it's above 1.

02:58 10 Q. And the exposure for the yellowfin here is 3.4, correct,  
02:58 11 parts per billion?

02:58 12 A. I believe that's correct.

02:58 13 Q. And the exposure here for the amberjack is 13.8 parts per  
02:58 14 billion; correct?

02:58 15 A. I believe that's correct.

02:58 16 Q. So none of the oil-exposed specimens on this diagram from  
02:58 17 which you conclude threshold effects of .3 actually were at .3.  
02:59 18 Instead they were at 8.5, 3.4, and 13.8 parts per billion;  
02:59 19 correct?

02:59 20 A. Correct. What Dr. Incardona is reporting, he reported a  
02:59 21 threshold concentration of .3 parts per billion for the bluefin  
02:59 22 tuna was causing effects. The examples here are -- yes, they  
02:59 23 are severely deformed embryos.

02:59 24 Q. The video that you ran and showed us, the slowed heart  
02:59 25 rate.

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02:59 1 A. Yes.

02:59 2 Q. Those were not at the .3 part per billion dosage rate;  
02:59 3 correct?

02:59 4 A. I'm not sure what dose they were. I suspect they were  
02:59 5 higher, like you say.

02:59 6 The threshold effect was for edema, which is  
02:59 7 beginning to indicate that you're going to get heart rate  
02:59 8 differences, that's correct.

02:59 9 Q. I want to make sure that we have no confusion because you  
02:59 10 played a video that showed heart effects and then you told us  
02:59 11 about threshold levels of .3. The video that you were showing  
03:00 12 us were at exposure levels above the EPA benchmark level of 1;  
03:00 13 correct?

03:00 14 A. I'm not sure about above the benchmark. I haven't  
03:00 15 converted all of his doses into that format.

03:00 16 Q. You don't know whether they were above or below; correct?

03:00 17 A. I know that the .3 is substantially below the benchmark of  
03:00 18 1, but I do not know the other doses.

03:00 19 Q. Okay. You do not know whether the exposure -- the dosage  
03:00 20 for the video that you showed us was for above or below the EPA  
03:00 21 dosage benchmark; correct?

03:00 22 A. It wasn't part of my purpose to convert all of his doses  
03:00 23 into TUs. No, I don't know the --

03:00 24 Q. Okay.

03:00 25 A. -- specific TU there.

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03:00 1 Q. Now, if we can now pull up TREX-13332-E.19.2.

03:01 2 And, Dr. Rice, you recognize this. This is from your  
03:01 3 appendix that you attached to your report that you contended  
03:01 4 was the peer-reviewed literature that supported your opinions  
03:01 5 in this case; correct?

03:01 6 A. This is Appendix C, I take it?

03:01 7 Q. Yes. Do you recognize it?

03:01 8 A. Yes.

03:01 9 Q. The top one, the top entry that you contend supports --  
03:01 10 excuse me -- a threshold effect at .3, that's this Incardona  
03:01 11 study that we've been referring to; correct?

03:01 12 A. Correct.

03:01 13 Q. And what is reported here -- and, again, this is for  
03:01 14 southern bluefin tuna that live in Australia, not the Gulf of  
03:01 15 Mexico; correct?

03:01 16 A. Same genus, yes.

03:01 17 Q. Okay. And the response that's reported here is edema;  
03:01 18 correct?

03:02 19 A. Yes.

03:02 20 Q. Now, you're aware that the Incardona study does not report  
03:02 21 the severity of the edema that he or his colleagues observed;  
03:02 22 correct?

03:02 23 A. Correct. He didn't grade them out, so to speak, yes.

03:02 24 Q. And you agree that you can have different severities of  
03:02 25 edema ranging from mild to severe; correct?

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03:02 1 A. Sure.

03:02 2 Q. And the consequences are different for edema depending on  
03:02 3 where you fall on that range or spectrum, mild to severe;  
03:02 4 correct?

03:02 5 A. I would assume that on the short term that that's probably  
03:02 6 true, you can get a range of effects.

03:02 7 Q. But you don't know the severity of this edema and what the  
03:02 8 ultimate effects were; correct?

03:02 9 A. I do not. You're asking for a very detailed level of --

03:02 10 Q. I'm asking because you relied on Dr. Incardona's study;  
03:03 11 and if you don't know, that's okay.

03:03 12 A. Okay. Thank you.

03:03 13 Q. Now, roughly half of the studies in your Appendix C that  
03:03 14 you report demonstrated a threshold injury level of .3 -- I'm  
03:03 15 sorry. Strike that.

03:03 16 Roughly half of the studies in this Appendix C that  
03:03 17 you reported demonstrated toxicity at a threshold below  
03:03 18 10 micrograms per liter are reporting edema or cardio effects;  
03:03 19 correct?

03:03 20 A. Correct. Somewhere in there I believe I note --

03:03 21 Q. You're not aware of a single study, other than those that  
03:03 22 you've listed in Appendix C, that demonstrate edema or cardio  
03:03 23 effects at early stage fishes in concentrations of less than  
03:03 24 10 micrograms per liter or parts per billion; correct?

03:03 25 A. I don't understand your question.



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03:03 1 Q. Other than what's on Appendix C, you're not aware of any  
03:03 2 other literature that demonstrates effects?

03:04 3 A. There could be others. I --

03:04 4 Q. Sitting here now, you're not aware of any others?

03:04 5 A. I believe that there's a Higgins study out there. There  
03:04 6 may be others. I'm not sure.

03:04 7 Q. Did you list the Higgins study in your Appendix C?

03:04 8 A. I don't believe -- I don't believe we did.

03:04 9 Q. Okay. We'll talk about the Higgins study. Other than the  
03:04 10 Higgins study, are you aware of any others?

03:04 11 A. No. This wasn't meant to be exhaustive. It's -- it's  
03:04 12 meant to be an example.

03:04 13 Q. It's an example of peer-reviewed literature that you  
03:04 14 contended supported your opinions in this case; correct?

03:04 15 A. Correct. It wasn't meant to be exhaustive. It was -- we  
03:04 16 were really targeting the *Deepwater Horizon* studies. These are  
03:04 17 just gathered in order to be supportive of that -- that they  
03:04 18 were not unique, for example.

03:04 19 Q. You would agree with me that all of the studies on  
03:04 20 Appendix C that you contend show cardio toxicity or edema at  
03:04 21 exposure levels below 10 micrograms per liter were conducted by  
03:05 22 Dr. Incardona either as the primary or contributing author;  
03:05 23 correct?

03:05 24 A. Well, what you're assuming there is a lot of these studies  
03:05 25 were done in previous years when we -- well, Incardona didn't

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03:05 1 come along until -- I don't know what year -- approximately the  
03:05 2 year 2000, sometime in there. So the advances that he's made  
03:05 3 in embryo toxicity studies weren't known to us prior to that  
03:05 4 date. I don't know exactly what date. The late '90s maybe,  
03:05 5 sometime in there.

03:05 6 So we didn't always look -- look for those sorts of  
03:05 7 effects. When we were doing the pink salmon experiments, we  
03:05 8 weren't looking for heart defects, for example. We were  
03:05 9 looking for spinal deformities, jaw deformities, for example,  
03:05 10 edema maybe, if they were obvious. But we weren't always  
03:05 11 looking for the intensity, the details that he was looking for.

03:05 12 Q. All the peer-reviewed literature that exists that you're  
03:06 13 aware -- aware of that shows edema or cardio effects below  
03:06 14 10 parts per billion have as the primary or contributing author  
03:06 15 Dr. Incardona; correct?

03:06 16 A. I'm not sure. I'd have to relook at all of these and get  
03:06 17 the list out and --

03:06 18 Q. We can move on.

03:06 19 If you were aware of it, you would have listed it in  
03:06 20 your support -- supporting materials; correct?

03:06 21 A. If they came to mind, yeah. This wasn't a focus area for  
03:06 22 us.

03:06 23 Q. Now, Dr. Incardona, in this study that resulted in this  
03:06 24 2014 publication, do you know where he got the data that he was  
03:06 25 analyzing?

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03:06 1 A. I'm not sure what data you're talking about. What data?

03:06 2 Q. Well, what data did Dr. Incardona analyze to reach his  
03:07 3 conclusions about possibly having edema at a threshold of  
03:07 4 .3 parts per billion?

03:07 5 A. You mean -- well, he analyzed the samples. He analyzed  
03:07 6 the biology and --

03:07 7 Q. Where did he get those samples?

03:07 8 A. What samples are you talking about?

03:07 9 Q. The samples that Dr. Incardona analyzed.

03:07 10 A. Are you talking biological samples, or are you talking  
03:07 11 chemical samples?

03:07 12 Q. The chemical samples.

03:07 13 A. He got those out of his bioassays, out of the stocks --

03:07 14 Q. Where did -- do you know, Dr. Rice, where Dr. Incardona  
03:07 15 got the water samples that he used in order to conduct the  
03:07 16 studies that resulted in this publication?

03:07 17 A. Well, he mixed the -- at site where the exposures are  
03:07 18 taking place, he mixed the oil and the solution using the HEWAF  
03:07 19 method. Is that your question?

03:08 20 Q. No. My question, I guess, is: Do you know whether  
03:08 21 Dr. Incardona used any of the NRD, the Natural Resource Damage  
03:08 22 Assessment data in order to conduct -- excuse me, conduct his  
03:08 23 analysis here?

03:08 24 A. Well, he didn't use them to conduct the tests. That's  
03:08 25 where I think I'm being confused by you there. He didn't use

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03:08 1 the NRDA database to conduct the test, the biology tests that  
03:08 2 he was doing. But he did use the NRDA database in order to see  
03:08 3 if his samples compare.

03:08 4 And if you remember the -- one of the diagrams there,  
03:08 5 it shows a sample out of -- I don't remember the cruises,  
03:08 6 they're named by vessels, but he matched the samples of three  
03:08 7 different cruises.

03:08 8 Q. And do you know whether he got those water samples --  
03:08 9 whether those water samples were intended to be representative  
03:08 10 of samples that were collected from May to June of 2010 that he  
03:09 11 had obtained through the NRD process?

03:09 12 A. Well, I guess you'd have to ask him. Those -- those data  
03:09 13 that he's referring to are in that database. And I doubt that  
03:09 14 he did a -- well, he didn't do a complete analysis of the  
03:09 15 database, he wouldn't have had the time. But he did find those  
03:09 16 samples. And I don't know what process or whatever he did.

03:09 17 Q. Did --

03:09 18 A. He certainly wouldn't have done an analysis of the  
03:09 19 database. That isn't his objective. I mean, he wants to be  
03:09 20 relevant, environmentally relevant, of course, in both  
03:09 21 composition and concentration. And this would indicate that he  
03:09 22 was.

03:09 23 Any detailed analysis of that database, which would  
03:09 24 have been the job of -- excuse me, which would have been the  
03:09 25 job of somebody else, presumably, in the NRDA system, to my

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03:09 1 knowledge just hasn't come out yet. We haven't seen an  
03:09 2 in-depth analysis of the -- of the NRDA database by the people  
03:09 3 that have -- that took the data, that gathered the samples and  
03:10 4 did the analysis.

03:10 5 Q. Did you, as part of your work --

03:10 6 THE COURT: Why don't you lift that microphone back  
03:10 7 up.

03:10 8 THE WITNESS: Sorry.

03:10 9 THE COURT: We have people in another room listening,  
03:10 10 too. Go ahead.

03:10 11 BY MS. KARIS:

03:10 12 Q. Did you, as part your remit in this case, look at any --

03:10 13 A. I didn't hear you.

03:10 14 Q. I'm sorry. Did you, as part of your remit in this case,  
03:10 15 look at any of the data that has been collected as part of the  
03:10 16 NRD process; yes or no?

03:10 17 A. I don't quite understand. There's a word there I didn't  
03:10 18 hear, about the third --

03:10 19 Q. Sure. Let me ask it again.

03:10 20 THE COURT: I didn't hear -- I didn't understand it.  
03:10 21 Did you say "remit"?

03:10 22 MS. KARIS: Remit.

03:10 23 BY MS. KARIS:

03:10 24 Q. As part of the work that you did in this case.

03:10 25 THE COURT: Okay.

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03:10 1 BY MS. KARIS:

03:10 2 Q. Let me rephrase it.

03:10 3 A. I don't quite know what you mean by "remit." That's --

03:10 4 Q. I apologize. I will withdraw it.

03:10 5 THE COURT: I don't either.

03:10 6 THE WITNESS: Oh, good.

03:10 7 BY MS. KARIS:

03:10 8 Q. As part of the instructions you were given in this case to  
03:10 9 render opinions about potential and actual harm to the  
03:10 10 environment, did you consult any data that was collected as  
03:11 11 part of the NRD process?

03:11 12 A. I guess the NRDA database that we're talking about, we  
03:11 13 were given access to the data, but we were not given access to  
03:11 14 the people that took the data. We were not given access to any  
03:11 15 of the -- any syntheses or anything out of that. We were just  
03:11 16 given the raw data, 18,000 samples.

03:11 17 Q. And those 18,000 samples, do you know whether that data  
03:11 18 was collected as part of the NRD process or if there's separate  
03:11 19 data for that?

03:11 20 A. I -- I really don't know that.

03:11 21 Q. All right. I'll move on.

03:11 22 You talked about HEWAF.

03:11 23 A. Yes.

03:11 24 Q. HEWAF is the methodology that Dr. Incardona used for his  
03:11 25 study; correct?

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03:11 1 A. That's correct.

03:11 2 Q. And HEWAF uses a commercial food blender to prepare an oil  
03:12 3 and water mixture that is then tested; correct?

03:12 4 A. Correct.

03:12 5 Q. In your report, you describe HEWAF as a method of using  
03:12 6 high energy; correct?

03:12 7 A. Correct.

03:12 8 Q. The high-energy blender method that Dr. Incardona used,  
03:12 9 according to you, is designed to entrain small dispersed  
03:12 10 droplets into the water; correct?

03:12 11 A. Correct.

03:12 12 Q. And it's supposed to then promote some of the heavier and  
03:12 13 more toxic compounds into solution; correct?

03:12 14 A. Because of the small droplets of significant quantities,  
03:12 15 presumably, of the heavy compounds that can then get into the  
03:12 16 solution, yes.

03:12 17 Q. You have no idea, though, how much energy is generated by  
03:12 18 the blender that was used in Dr. Incardona's experiment;  
03:12 19 correct?

03:12 20 A. Correct. And I don't really care. All I want to know is  
03:12 21 if the composition, the resulting composition that he uses is  
03:13 22 relevant.

03:13 23 Q. Okay.

03:13 24 A. It's hard to equate -- excuse me. It's hard to equate  
03:13 25 laboratories -- it's hard to equate laboratory studies with the

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03:13 1 environment.

03:13 2 Q. Do you need some water?

03:13 3 A. Yes, I do. Give me about two seconds. Thank you.

03:13 4 It's hard to equate laboratory studies, laboratory  
03:13 5 energy and mixing methods. You can't mimic the environment  
03:13 6 precisely, or maybe even crudely, for that matter. But what  
03:13 7 you can do is mix up compositions and concentrations that have  
03:13 8 some sort of environmental relevance, and that was the goal  
03:13 9 here. That's the goal of these things.

03:13 10 Q. All right. All right. I'm sorry. So just to be clear --  
03:13 11 if I get an answer with the coughing, I apologize.

03:13 12 So you do not know how much energy was generated,  
03:13 13 though, by using the blender method; correct?

03:14 14 A. That's correct, I do not.

03:14 15 Q. And you don't know whether the energy that was at the  
03:14 16 surface is similar to the energy in the blender that  
03:14 17 Dr. Incardona used; correct?

03:14 18 A. I have no idea. That's correct.

03:14 19 Q. Dr. Incardona's paper references 78 samples; do you recall  
03:14 20 that?

03:14 21 A. Actually, I do not.

03:14 22 Q. Okay. If we can pull up your deposition at 211, lines 15  
03:14 23 to 19, to see if this helps refresh your recollection.

03:14 24 Actually, we have the Incardona study as well.

03:14 25 Do you recall when you were asked:



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03:14 1 "QUESTION: Do you know where in the Gulf of Mexico  
03:14 2 the 78 samples were collected from that Dr. Incardona  
03:14 3 utilized in his re-publication?"

03:14 4 And you say you have no idea?

03:14 5 A. And I still have no idea.

03:14 6 Q. Okay. So I believe you were speaking to where from the  
03:15 7 Gulf of Mexico those samples were. You said you had no idea.  
03:15 8 And it's your testimony today you don't even have an idea as to  
03:15 9 how many samples there were; correct?

03:15 10 A. Well -- correct. I -- no, I do not know -- I don't know  
03:15 11 the process he used to get, quote, the 78, when there's 18,000,  
03:15 12 you know. I don't know what he used.

03:15 13 Q. Okay. So just to wrap up on this piece, Dr. Rice, you're  
03:15 14 relying on Dr. Incardona's study. You do not know how many  
03:15 15 samples he used, where those samples came from, what process he  
03:15 16 used or how much energy was generated by the HEWAF blender that  
03:15 17 he used; correct?

03:15 18 MS. FIDLER: Objection, Your Honor. This is a  
03:15 19 compound question, of which most of it has been asked and  
03:15 20 answered.

03:15 21 MS. KARIS: I'm happy to do it one piece at a time.  
03:15 22 If it's in the record, I'm happy to move on.

03:15 23 THE COURT: Well, it sounds like -- it sounds like  
03:16 24 you're just asking him to confirm what he's already said.  
03:16 25 Piece by piece, you're trying to throw it all together, so --

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03:16 1 MS. KARIS: I was trying to summarize.

03:16 2 THE COURT: I'll sustain the objection. Okay.

03:16 3 BY MS. KARIS:

03:16 4 Q. Dr. Rice, you would agree with me that you were missing  
03:16 5 several pieces of information with respect to Dr. Incardona's  
03:16 6 study; correct?

03:16 7 A. Well, for a detailed, precise evaluation, I suppose you're  
03:16 8 correct. I was relying that this is, one, a peer-reviewed  
03:16 9 publication. I could tell in my own review that it was a  
03:16 10 high-quality publication, I believe. Will it answer all of  
03:16 11 your environmental questions? I guess not.

03:16 12 Q. Okay. Now, we were talking about HEWAF and its  
03:16 13 reliability. And I believe you said there is no standard  
03:16 14 method; correct?

03:16 15 A. Not in --

03:16 16 Q. For conducting testing?

03:17 17 A. That's correct. I said that. And what I meant was in  
03:17 18 environmental and damage assessment-type studies, like this  
03:17 19 was, bioassays, no, there is no standard that is required.

03:17 20 Q. Dr. Incardona relied on HEWAF; correct?

03:17 21 A. Uh-huh. That's correct.

03:17 22 Q. And you're not aware of a single instance in which the EPA  
03:17 23 has relied on the HEWAF methodology; correct?

03:17 24 A. I am not, but HEWAF -- excuse me. But EPA does not do  
03:17 25 damage assessment studies. This is more in the purview of

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03:17 1 NOAA, and they're going to study site-specific,  
03:17 2 species-specific-type studies, and that's what they're doing  
03:17 3 relative to the Gulf.

03:17 4 Q. The EPA, in conducting any and all of its toxicological  
03:17 5 testing --

03:17 6 A. Which are not site-specific damage assessment studies.

03:17 7 Q. They do not use HEWAF; correct?

03:17 8 A. I don't believe they do. They do -- they do have a CEWAF  
03:17 9 standard method, I believe. I'm not 100 percent sure of that.  
03:18 10 But I think they have CEWAF in there.

03:18 11 Q. Would you agree with me that it is important to understand  
03:18 12 what -- strike that.

03:18 13 When conducting toxicity experiments using HEWAF, you  
03:18 14 need the analytical chemistry measurements for each exposure;  
03:18 15 correct?

03:18 16 A. Do you need them all? No. Are they all ideal? Yes.

03:18 17 Q. And you agree that it's important to understand what the  
03:18 18 concentration and compositions are and how they change over  
03:18 19 time?

03:18 20 A. It's very, very desirable, yes.

03:18 21 Q. You mentioned CEWAF. Do you know whether that is used for  
03:18 22 dispersants?

03:18 23 A. Correct. That's chemical enhanced. That's what the C is  
03:18 24 for, chemical enhanced, short for dispersants.

03:18 25 Q. Now, Dr. Incardona's study that used HEWAF, you understand

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03:18 1 that all of the samples other than the highest concentrations  
03:18 2 and the controls for bluefin tuna were lost in transit from  
03:19 3 Australia to the United States; correct?

03:19 4 A. That's correct. That's part of the imperfectness of this  
03:19 5 study.

03:19 6 Q. As a consequence, the only analytical chemistry from  
03:19 7 Dr. Incardona's study for his bluefin tuna experiment was the  
03:19 8 chemistry data for the highest initial PAH concentrations;  
03:19 9 correct?

03:19 10 A. That's correct, as I understand it, anyway.

03:19 11 Q. For all other concentrations, Dr. Incardona was unable to  
03:19 12 conduct analytical chemistry; correct?

03:19 13 A. Right. He operated under the principles of dilution.

03:19 14 Q. He had to estimate the PAH concentrations and  
03:19 15 compositions; correct?

03:19 16 A. He had -- correct. He did that because he knew what the  
03:19 17 dilutions of the stock were, of course.

03:19 18 Q. But he estimated because he had lost the samples; correct?

03:19 19 A. I'd say he measured it, he just didn't measure it  
03:19 20 chemically, which would be the ideal, preferred way. I mean,  
03:19 21 he measured the dilutions, so they're not estimated, they're  
03:20 22 measured.

03:20 23 Q. Would that be another missing piece of information from  
03:20 24 Dr. Incardona's study?

03:20 25 A. Well, yes. But the other two species did not have this

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03:20 1 sort of problem.

03:20 2 Q. You testified that Dr. Shea thought that the Incardona  
03:20 3 study was seriously flawed, if I heard your words correctly.

03:20 4 A. I don't remember saying seriously flawed. I know he  
03:20 5 criticized them for not being standard.

03:20 6 Q. And do you know whether some of the criticisms that  
03:20 7 Dr. Shea has is because of all of the missing information from  
03:20 8 the Incardona study, including some of which we've talked about  
03:20 9 here today?

03:20 10 A. I think you should ask that question of Dr. Shea, not me.

03:20 11 Q. Okay. And we will.

03:20 12 Let's talk now about the Carls and Heintz  
03:20 13 publications that you rely on as part of the -- part of the  
03:21 14 peer-reviewed literatures that you contend supports your  
03:21 15 opinions.

03:21 16 MS. KARIS: TREX-13332-E.1.9, please. Can we bring  
03:21 17 that up.

03:21 18 BY MS. KARIS:

03:21 19 Q. And, again, this is the second species identified in your  
03:21 20 Appendix C that you contend supports your opinions about .3  
03:21 21 being a threshold where there might be sufficient exposure for  
03:21 22 harm; correct?

03:21 23 A. Correct, I think.

03:21 24 Q. And this is -- the author here is Dr. Carls; correct?

03:21 25 A. He's the lead author, yes.

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03:21 1 Q. And that's Mark Carls --

03:21 2 A. Correct.

03:21 3 Q. -- who assisted you in this case; correct?

03:21 4 A. Yes.

03:21 5 Q. You're a coauthor on this paper?

03:21 6 A. If I remember exactly, yes.

03:21 7 Q. And this is studying Pacific herring; correct?

03:21 8 A. That's correct.

03:21 9 Q. And, again, Pacific herring do not live in the Gulf of  
03:22 10 Mexico, do they?

03:22 11 A. No, they do not.

03:22 12 Q. And the method used here is ORC?

03:22 13 A. Right.

03:22 14 Q. That's oil, gravel, and column method; correct?

03:22 15 A. Well, the R stands for rock; but you're right, it's  
03:22 16 gravel, small -- small gravel.

03:22 17 Q. Okay. Oil, rock?

03:22 18 A. Yeah.

03:22 19 Q. Okay.

03:22 20 A. Same thing.

03:22 21 Q. All right. And that is not a widely used method, is it?

03:22 22 A. No, it is not.

03:22 23 Q. And you're not contending that the ORC method represents  
03:22 24 conditions in the Gulf of Mexico, are you?

03:22 25 A. No, I'm not. We designed that in order to mimic the

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03:22 1 conditions we were seeing in Prince William Sound following the  
03:22 2 *Exxon Valdez* spill.

03:22 3 Q. Now, this publication has been the subject of some  
03:22 4 peer-reviewed literature criticism; correct?

03:22 5 A. That's correct.

03:22 6 MS. KARIS: Let's pull up TREX-13336.1.1.

03:22 7 BY MS. KARIS:

03:22 8 Q. You recognize this document; correct, by Drs. Page --  
03:22 9 Dr. Page and others titled prospective article -- "A  
03:23 10 Perspective on the Toxicity of Low Concentrations of  
03:23 11 Petroleum-derived Polycyclic Aromatic Hydrocarbons to Early  
03:23 12 Life Stages of Herring and" sample -- I'm sorry, "Salmon."  
03:23 13 You're familiar with this document; correct?

03:23 14 A. I am familiar. There's -- these authors have published  
03:23 15 several criticisms of these papers.

03:23 16 Q. Okay. And what they're criticizing is the document or the  
03:23 17 publication that you list in your Appendix C, the second item  
03:23 18 there that we were just looking at; correct?

03:23 19 A. That's correct.

03:23 20 Q. Okay. If we can look at 13336.2.1.

03:23 21 And what they say is, "We have reviewed all available  
03:23 22 information pertaining to the toxicity studies of Heintz and  
03:23 23 Carls, et. al., as well as related studies."

03:23 24 Correct?

03:23 25 A. That's what it reads.

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03:23 1 Q. Okay.

03:23 2 MS. KARIS: If we can now go to 13336.1.2, please.

03:24 3 BY MS. KARIS:

03:24 4 Q. It says: "Based on a review of the evidence from  
03:24 5 published project reports, peer-reviewed publications,  
03:24 6 chemistry data and public database, and unpublished reports and  
03:24 7 laboratory records, the reviewed studies did not establish  
03:24 8 consistent dose (concentration) response or causality and thus  
03:24 9 do not demonstrate that dissolved PAH alone from the weathered  
03:24 10 oil resulted in the claimed effects of the fish embryo at low  
03:24 11 microgram-per-liter" rates -- correct, "concentrations."

03:24 12 Correct?

03:24 13 A. That's how it reads.

03:24 14 Q. And what they go on to conclude is the study should not be  
03:24 15 relied on when assessing the risk of low PAH exposures to early  
03:24 16 life stages of fish; correct?

03:24 17 We can pull it up, but do you recall if that's what  
03:24 18 they conclude?

03:24 19 A. I can read it, and you read it accurately.

03:25 20 MS. KARIS: And if we can now go to TRES-13336.25.1,  
03:25 21 please.

03:25 22 BY MS. KARIS:

03:25 23 Q. In their conclusion, what they stated --

03:25 24 A. Is this the same paper?

03:25 25 Q. It is.



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03:25 1 A. Okay.

03:25 2 Q. "The conclusions of Heintz and Carls that weathered oil is  
03:25 3 more toxic than unweathered oil and that such toxicity occurs  
03:25 4 at about 1 microgram per liter dissolved TPAH are not supported  
03:25 5 by the data, based on our analysis of their published and  
03:25 6 unpublished data."

03:25 7 That was their conclusion; correct?

03:25 8 A. At least part. You read that accurately.

03:25 9 Q. And you included this Heintz publication in your  
03:25 10 Appendix C as supportive of your opinions; correct?

03:26 11 A. That's correct.

03:26 12 Q. And you also included Carls, the Carls publication as  
03:26 13 supportive of your opinions; correct?

03:26 14 A. The papers on pink salmon and Heintz's work and Carls'  
03:26 15 works on the -- mostly on the herring.

03:26 16 Q. Appendix C, which contained all the peer-reviewed  
03:26 17 literature that you contended supported your opinions, also  
03:26 18 referenced Dr. Incardona's study with respect to yellowfin tuna  
03:26 19 and amberjack; correct?

03:26 20 A. Yes.

03:26 21 MS. KARIS: Okay. If we can now look at  
03:26 22 TREX-13332-E.20.1.

03:26 23 BY MS. KARIS:

03:26 24 Q. Again, using the HEWAF method -- and this is at  
03:27 25 concentrations of 1.0 to 2.6 micrograms per liter -- what they

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03:27 1 conclude is that the response for yellowfin tuna is heart  
03:27 2 rate -- is it bradycardia threshold?

03:27 3 A. Correct. That's slowing of the heart rate. Bradycardia  
03:27 4 is slow.

03:27 5 Q. Okay. Now, nowhere in the Incardona study do the authors  
03:27 6 provide any data of actual impacts to the yellowfin tuna  
03:27 7 population; correct?

03:27 8 A. Not to the population. This is a laboratory bioassay to  
03:27 9 demonstrate mechanism.

03:27 10 Q. The next entry, .2.0, 13332-E.2.0, this is an example of  
03:27 11 one of the corrections that you made to your Round 3 report;  
03:27 12 correct?

03:27 13 A. Correct. I had gotten the genus correct, but I'd  
03:27 14 mislabeled -- misidentified the species.

03:27 15 Q. Okay.

03:27 16 A. I had the wrong one.

03:27 17 Q. All right. And it's yellowtail amberjack, not greater  
03:28 18 amberjack, as you had identified it; right?

03:28 19 A. Right.

03:28 20 Q. And again, the yellowtail amberjack that Dr. Incardona is  
03:28 21 reporting on also does not reside in the Gulf of Mexico;  
03:28 22 correct?

03:28 23 A. Correct. That's an Australian species that are being  
03:28 24 cultured. So he had access to the embryos. The greater  
03:28 25 amberjack would be the one we would really prefer. It was not

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03:28 1 cultured, so he didn't have access to the embryos.

03:28 2 Q. You would agree with me, Dr. Rice, that you do not know if  
03:28 3 there are differences in reactions to exposure between greater  
03:28 4 amberjack that you listed in your original report and  
03:28 5 yellowtail amberjack that Dr. Incardona actually studied;  
03:28 6 correct?

03:28 7 A. That's correct. I would expect them to be in the low  
03:28 8 similar range, low parts per billion. But if one's a little  
03:28 9 bit higher than the other, or a little bit lower, you're  
03:29 10 correct, I don't know the precise differences between the  
03:29 11 species of -- response of the two species.

03:29 12 Q. You've previously told us that you are not an expert in  
03:29 13 species, on different species and differences between species;  
03:29 14 correct?

03:29 15 A. Well, what I said was I'm not obviously a taxonomist and  
03:29 16 I'm -- I'm also not from the Gulf Coast. So, yeah, the common  
03:29 17 names and getting the genus species right, obviously I'm not a  
03:29 18 very good expert at that, am I?

03:29 19 Q. I think what you said is "they all look the same to me";  
03:29 20 correct?

03:29 21 A. I don't remember saying that. But I don't know what any  
03:29 22 one of them looks like. I'm looking at the data. I don't go  
03:29 23 out there and fish for either species. I've never caught an  
03:29 24 amberjack or a yellowfin or a tuna or whatever, so I have no  
03:29 25 idea what they look like.

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03:29 1           **THE COURT:** Ms. Karis, do you have -- how much more  
03:29 2 do you have? I'm trying to decide if we should break now or  
03:29 3 what.

03:29 4           **MS. KARIS:** Well, Your Honor, I probably have a good  
03:29 5 20 minutes.

03:29 6           **THE COURT:** All right. Let's take about a 15-minute  
03:30 7 recess.

03:30 8           **MS. KARIS:** Thank you.

03:30 9           **THE DEPUTY CLERK:** All rise.

03:30 10           (WHEREUPON, the Court took a recess.)

03:32 11           **THE DEPUTY CLERK:** All rise.

03:47 12           **THE COURT:** Please be seated, everyone.

03:47 13           All right. Ms. Karis, you may resume.

03:47 14           **MS. KARIS:** Thank you, Your Honor.

03:47 15           And just for the record, we're continuing the  
03:47 16 cross-examination of -- Hariklia Karis continuing the  
03:47 17 cross-examination of Dr. Rice.

03:47 18           **BY MS. KARIS:**

03:47 19           **Q.** Dr. Rice, we were speaking before the break about some of  
03:47 20 the studies and the species that you listed on Appendix A. If  
03:47 21 we can now pull up one -- I'm sorry, Appendix C of your report.

03:47 22           **MS. KARIS:** If we can pull up TRES-13332E.19.8,  
03:47 23 please.

03:47 24           **BY MS. KARIS:**

03:47 25           **Q.** Here again, we have Atlantic cod as one of the species

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03:48 1 that you're relying on in support of your opinions in this  
03:48 2 case; is that correct?

03:48 3 A. That's correct.

03:48 4 Q. And again, Atlantic cod, that's not a Gulf of Mexico  
03:48 5 species, is it?

03:48 6 A. No. No, it is not.

03:48 7 MS. KARIS: Next, TREX-013332.F -- I'm sorry, E.20.4,  
03:48 8 please.

03:48 9 BY MS. KARIS:

03:48 10 Q. Here are a couple of other species that you list in your  
03:48 11 report, and you referenced this Mager publication -- Mager,  
03:48 12 excuse me, publication, in support of your opinions in this  
03:48 13 case and you discussed it during your direct examination. Do  
03:49 14 you recall that?

03:49 15 A. That's correct.

03:49 16 Q. Now, just like Dr. Incardona, the Mager study, which  
03:49 17 resulted in these concentration levels of 1.2 micrograms per  
03:49 18 liter, that relied on the HEWAF methodology; correct?

03:49 19 A. That's correct. Incardona is a coauthor with Mager in  
03:49 20 that paper.

03:49 21 Q. And that was going to be my next question, which is: This  
03:49 22 paper, again, is a Dr. Incardona coauthored publication that  
03:49 23 relies on this HEWAF method; correct?

03:49 24 A. Correct.

03:49 25 Q. You're aware that Dr. Mager's results, likewise, have not

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03:49 1 been reproduced by any other scientists; correct?

03:49 2 A. Well, they have not been attempted with this species.

03:49 3 Let's phrase it that way.

03:50 4 Q. Using the same species, Dr. Mager's results have not been  
03:50 5 reproduced by any other scientists; is that correct?

03:50 6 A. Well, that is true; but a lot of studies have not been  
03:50 7 replicated in that fashion.

03:50 8 Q. And, similarly, Dr. Incardona's study has not been  
03:50 9 replicated using the exact same species; correct?

03:50 10 A. Correct. To my knowledge, nobody's even attempted it.

03:50 11 MS. KARIS: If we can pull up TREX-13338.1.1, please.

03:50 12 BY MS. KARIS:

03:50 13 Q. You recognize this is the Mager study, "Acute Embryotic or  
03:50 14 Juvenile Exposure to *Deepwater Horizon* Crude Oil Impairs the  
03:50 15 Swimming Performance of Mahi-Mahi." Correct?

03:50 16 A. Correct.

03:50 17 MS. KARIS: If we can now go to .6.1.

03:50 18 BY MS. KARIS:

03:50 19 Q. It states in the Mager study that "Although direct  
03:50 20 measurements of cardiac performance were not made, the lack of  
03:50 21 an effect on" -- is it aerobic --

03:51 22 A. Aerobic.

03:51 23 Q. -- "aerobic scope" --

03:51 24 A. That's an "E".

03:51 25 Q. -- "strongly indicates that cardiac output was

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03:51 1 maintained."

03:51 2 Correct?

03:51 3 A. That's what it says.

03:51 4 Q. Nowhere in your expert report do you state that cardiac  
03:51 5 function was maintained for this Mager study even though you  
03:51 6 list it as supporting your opinions for causing impairment;  
03:51 7 correct?

03:51 8 A. Correct. The important point here was the swimming  
03:51 9 performance, which is really the net effect -- net result,  
03:51 10 rather, of first supposing the embryos and then growing them  
03:51 11 out and looking at what their functional performance was and  
03:51 12 these guys have reduced swimming performance.

03:51 13 And swimming performance is really a function of the  
03:51 14 animal's ability, including aerobic scope, as you put here, but  
03:51 15 also was there any damage to the muscle or any other  
03:51 16 infrastructure issues, and we don't really know.

03:52 17 We just know that the net result here is that the  
03:52 18 swimming point was -- the swimming performance was reduced,  
03:52 19 even though we don't know the specific reasons.

03:52 20 It's quite possible, for example, that the heart was  
03:52 21 impacted -- probably was -- had edema, for example, in those  
03:52 22 embryos, and yet the heart recovered in function, and yet some  
03:52 23 downstream damage in these tissues, probably, and muscles  
03:52 24 occurred, but you really don't know.

03:52 25 Q. We don't know --

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03:52 1 A. All you now is the net result is that these exposed  
03:52 2 animals still had a swimming performing issue 30 days after the  
03:52 3 exposure.

03:52 4 THE COURT: Before you ask your next questions, I  
03:52 5 want to -- the two words up there, the "acrobic," is the second  
03:52 6 word "aerobic"?

03:52 7 THE WITNESS: No, it's aerobic, A-E-R --

03:52 8 THE COURT: But the first one in the second line is  
03:52 9 "acrobic" or "aerobic"?

03:52 10 THE WITNESS: It's aerobic, A --

03:52 11 THE COURT: So that's an "E".

03:52 12 THE WITNESS: -- A-E -- it looks like a "C" but  
03:52 13 that's a printing problem.

03:52 14 THE COURT: So in both -- both the second line and  
03:52 15 the second to the last line, it's "aerobic"?

03:52 16 THE WITNESS: Correct.

03:52 17 THE COURT: A-E-R --

03:52 18 THE WITNESS: A-E-R.

03:53 19 THE COURT: Okay. That's all I wanted to know.

03:53 20 Thank you. Okay.

03:53 21 BY MS. KARIS:

03:53 22 Q. Is it fair to say that we do not know what the ultimate  
03:53 23 effect of this cardiac study on mahi-mahi from Dr. Mager is?

03:53 24 A. I'm sorry, could you repeat --

03:53 25 Q. I'll withdraw the question. I'll withdraw the question.



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03:53 1 A. Well, we know that the swimming performance is affected.

03:53 2 Q. But beyond that, we don't know what the end point effect  
03:53 3 is; correct?

03:53 4 A. Well, you got to know whether we can surmise, estimate,  
03:53 5 for example, that because of the swimming performance effect,  
03:53 6 that the animal's chances of survival in the wild would be  
03:53 7 reduced, whether it is reduced or they'll reproduce in five  
03:53 8 years, yeah, you don't know those issues.

03:53 9 Q. Again, to use --

03:53 10 A. It's showing potential.

03:53 11 Q. To use your words, we would be surmising; correct?

03:53 12 A. Yeah, it would be educated surmising.

03:53 13 Q. Let's go to a new subject, population data.

03:53 14 Is it correct that you are not contending that there  
03:54 15 has been a shrimp population collapse in the Gulf of Mexico?

03:54 16 A. I don't believe I discussed shrimp whatsoever, so why  
03:54 17 would you go there?

03:54 18 Q. Any -- would you agree that any hypothesis of a shrimp  
03:54 19 population collapse would be mere speculation?

03:54 20 A. No, I wouldn't agree with that. What I -- what I'll say  
03:54 21 is that I have no opinion because I did not study shrimp. I  
03:54 22 didn't even look at a shrimp effects paper, and I'm certainly  
03:54 23 not looking at the population. That would have been in  
03:54 24 Dr. Boesch's realm.

03:54 25 Q. Okay. So you have no opinion regarding any population

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03:54 1 effect on any species; is that correct?

03:54 2 A. That would be correct.

03:54 3 Q. Okay. You mentioned coral?

03:54 4 A. In the reports, yes.

03:55 5 Q. Yes, in your Round 1 report.

03:55 6 MS. KARIS: And if we can pull up 13330.29.1, please.

03:55 7 BY MS. KARIS:

03:55 8 Q. Do you recognize this as an excerpt from your expert  
03:55 9 report?

03:55 10 A. Yes.

03:55 11 Q. And you reference visual damage -- I'm sorry, visual  
03:55 12 evidence of damage to deep sea coral and brittle stars was  
03:55 13 detected 11 kilometers southwest from the wellhead, and your  
03:55 14 support for that is the White publication; is that correct?

03:55 15 A. That's correct.

03:55 16 Q. And then you go on to say later that "Two other  
03:55 17 communities of corals were found to be impacted by the  
03:55 18 *Deepwater Horizon* at 6 and 22 kilometers from the wellhead."

03:55 19 And there you reference the Fisher paper; correct?

03:55 20 A. That's correct.

03:55 21 MS. KARIS: Now if we can look at TREX-13195.1.1,  
03:55 22 please.

03:55 23 BY MS. KARIS:

03:55 24 Q. This is the White publication, the first citation in your  
03:56 25 opinion; correct?

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03:56 1 A. Correct.

03:56 2 Q. And we see here that in that White publication they state,  
03:56 3 "Healthy coral communities were observed at all sites greater  
03:56 4 than 20 kilometers from the Macondo well, including seven sites  
03:56 5 previously visited in September of 2009, where the corals and  
03:56 6 communities appeared unchanged."

03:56 7 Correct?

03:56 8 A. That's what it states, yes.

03:56 9 Then it goes "however" --

03:56 10 Q. And this -- and this is a December 2012 publication;  
03:56 11 correct?

03:56 12 A. That's correct.

03:56 13 Q. You did no independent evaluation of Dr. White's analysis;  
03:56 14 correct?

03:56 15 A. That's correct.

03:56 16 Q. And the second paper you referenced was -- had the lead  
03:56 17 author of Dr. Fisher; correct?

03:57 18 A. That's correct.

03:57 19 MS. KARIS: And now if we can pull up TREN-13196.1.1.

03:57 20 BY MS. KARIS:

03:57 21 Q. And is this the publication from Dr. Fisher that you  
03:57 22 referenced on your direct examination --

03:57 23 A. I believe --

03:57 24 Q. -- dated August 12th of 2014?

03:57 25 A. I believe it is.

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03:57 1 Q. Okay. You -- again, you did not analyze any of the  
03:57 2 underlying data in the Fisher publication?

03:57 3 A. No, I read the report and reviewed it and . . .

03:57 4 Q. You didn't look at any of the underlying data; correct?

03:57 5 A. That's correct.

03:57 6 MS. KARIS: And if we can now go to .5.3, please --  
03:57 7 that's 13196.5.3.

03:57 8 THE WITNESS: Is this the same paper?

03:57 9 BY MS. KARIS:

03:57 10 Q. Do you recognize it as the Fisher publication that you  
03:57 11 relied on?

03:57 12 A. I --

03:57 13 Q. I'll represent to you this is from the --

03:57 14 A. Okay.

03:57 15 Q. -- Fisher paper that is cited in your expert report --

03:57 16 A. Okay.

03:57 17 Q. -- that we were just looking at.

03:57 18 A. Okay. Thank you.

03:57 19 Q. It states, "Fourteen coral colonies exhibited evidence of  
03:58 20 recent impact noted by both observers. Most of these had only  
03:58 21 small areas impacted, either because the corals were quite  
03:58 22 small or because only small portions of the corals were  
03:58 23 impacted. Although, six corals showed visible evidence of  
03:58 24 impact to over 10 percent of the colonies."

03:58 25 Correct?

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03:58 1 A. Correct.

03:58 2 Q. That is -- do you know -- do you have an understanding of  
03:58 3 where these authors were looking for coral colonies; that is,  
03:58 4 where these colonies were located?

03:58 5 A. I'm not a coral expert; but from the reading of the  
03:58 6 papers, I knew that they were within, what -- 10 to -- 10 to  
03:58 7 20 kilometers of the wellhead and I know they were very, very  
03:58 8 deep down there at roughly 1300 meters or so, somewhere in that  
03:58 9 range.

03:58 10 Q. They were located at lease block MC344; correct?

03:59 11 A. That could be, I don't know.

03:59 12 Q. And do you -- have you looked at the water chemistry  
03:59 13 specifically in and around MC344?

03:59 14 A. No.

03:59 15 Q. Which is where these samples -- where these corals were  
03:59 16 observed?

03:59 17 A. No. I did note that in the previous paper by White, that  
03:59 18 Dr. Reddy, who was a chemist, had analyzed and looked very  
03:59 19 specifically for evidence of oil exposure. He could not  
03:59 20 fingerprint the PAH, the residue, that oily marine -- he could  
03:59 21 not fingerprint it to the *Deepwater Horizon*. He then went to  
03:59 22 the biomarkers, and there was a pretty good suggestive  
03:59 23 evidence.

03:59 24 In other words, to me that means more likely than not  
03:59 25 that it was from the Macondo oil, but it wasn't at, say, the

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03:59 1 95 percent level.

03:59 2 Q. Now you're talking about the White paper; is that correct?

03:59 3 A. I'm talking about the chemistry that came out of the White  
03:59 4 paper.

03:59 5 Q. But I was talking about the Fisher --

03:59 6 A. To my knowledge, there's no chemistry that's in this  
04:00 7 particular paper.

04:00 8 Q. All right. The Fisher paper that you referenced, that was  
04:00 9 the one we were talking about.

04:00 10 A. Correct.

04:00 11 Q. Those corals that they're discussing came from MC344;  
04:00 12 correct?

04:00 13 A. Right.

04:00 14 Q. Or from around MC344; correct?

04:00 15 A. I do not know that.

04:00 16 Q. You don't know where they came from. You don't know what  
04:00 17 the water chemistry in or around that block looked like;  
04:00 18 correct?

04:00 19 A. There's no water chemistry reported in this paper, no.

04:00 20 Q. And you do know that there was sediment chemistry in the  
04:00 21 area that Dr. Fisher is talking about in this paper; correct?

04:00 22 A. I do not remember that.

04:00 23 Q. But --

04:00 24 A. In this paper?

04:00 25 Q. Correct.

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04:00 1 A. I do not remember that.

04:00 2 Q. You don't remember that he referenced sediment chemistry,  
04:00 3 and what we know is that you did not review any of the sediment  
04:00 4 chemistry; correct?

04:00 5 A. I did not -- I did not review any -- I didn't do a  
04:00 6 complete job. I did not do an exhaustive job. I think I did a  
04:01 7 pretty good job once it's corrected on the water column but not  
04:01 8 the sediments. I just didn't get that far.

04:01 9 Q. I was talking about sediment chemistry, Dr. Rice.

04:01 10 A. I was just trying to clarify how much I did on the  
04:01 11 sediments, and it would be very minimal.

04:01 12 Q. Very minimal on the sediments --

04:01 13 A. I relied on the data that would be reported in these  
04:01 14 various publications. I didn't go into significant depth on  
04:01 15 those.

04:01 16 Q. The sediment chemistry that you went into depth on, none  
04:01 17 of that sediment chemistry was what Dr. Fisher was looking at;  
04:01 18 correct?

04:01 19 A. You're correct in that.

04:01 20 Q. Thank you.

04:01 21 MS. KARIS: TREX-13275.1.1, please.

04:01 22 BY MS. KARIS:

04:01 23 Q. Do you recognize this Fisher publication?

04:01 24 A. No, I do not.

04:01 25 Q. This is dated September 2014. Since you relied on

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04:01 1 Dr. Fisher, did you also look at this publication in support of  
04:02 2 your work and opinions in this case since you were speaking to  
04:02 3 damage to corals?

04:02 4 A. I completed the Round 1 report where I went into the  
04:02 5 corals. I don't recall looking at this paper, to be honest. I  
04:02 6 may have. I don't remember.

04:02 7 Q. All right.

04:02 8 MS. KARIS: All right. If we can now look at  
04:02 9 13275.3.1.

04:02 10 BY MS. KARIS:

04:02 11 Q. Dr. Fisher and his coauthors report in September of 2014,  
04:02 12 "Furthermore, colonies observed with low levels of flock on  
04:02 13 their service in 2010" -- surface, excuse me, "in 2010, less  
04:02 14 than 20 percent coverage, were likely to exhibit apparently  
04:02 15 complete recovery of the flock-covered branches by March of  
04:02 16 2012. "

04:02 17 Were you aware of that finding?

04:02 18 A. I don't recall. But I also see a "however." So I'm not  
04:02 19 going to opine on this without rereading this paper.

04:03 20 Q. You don't know one way or the other whether that's  
04:03 21 accurate; correct?

04:03 22 A. I do not.

04:03 23 Q. Sitting here today, do you have any reason to disagree  
04:03 24 with Dr. Fisher's findings since you relied on his earlier  
04:03 25 publication in support of your opinions in this case?



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04:03 1 MS. FIDLER: Objection, Your Honor. The witness has  
04:03 2 stated that he would want to see the rest of this paper before  
04:03 3 offering an opinion on it.

04:03 4 MS. KARIS: I'll withdraw the question, Your Honor.

04:03 5 THE COURT: Okay.

04:03 6 BY MS. KARIS:

04:03 7 Q. You referenced Pacific herring as part of your direct  
04:03 8 examination.

04:03 9 A. Yes.

04:03 10 Q. And you also referenced Pacific herring in your Round 3  
04:03 11 report; correct?

04:03 12 A. Again, I don't remember. I'm sure you'll remind me.

04:03 13 Q. Sure.

04:03 14 MS. KARIS: Let's pull up 13332.16.1, please.

04:04 15 BY MS. KARIS:

04:04 16 Q. Does this remind you that this comes from your expert  
04:04 17 report? And it's part of your Round 3 report, I'll represent  
04:04 18 to you.

04:04 19 A. Okay. I -- I recognize the sentences. I've written them  
04:04 20 several times, actually.

04:04 21 Q. You state here: "Although there have been many years of  
04:04 22 studies on herring, there is no satisfactory explanation of  
04:04 23 their crash, whether it was oil related or not."

04:04 24 Correct?

04:04 25 A. That's correct. That's accurate.

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04:04 1 Q. With the information collected during those years, it is  
04:04 2 not possible to prove that the oil spill caused the crash, nor  
04:04 3 does that prove that oil was not a contributing factor.

04:04 4 Correct?

04:04 5 A. Correct.

04:04 6 Q. We simply do not know the cause.

04:05 7 Correct?

04:05 8 A. That is correct. It's a disappointment that we don't know  
04:05 9 one way or the other.

04:05 10 Q. You agree that there have been other serious declines in  
04:05 11 herring populations in Alaska; correct?

04:05 12 A. Well, here's the -- "serious" is -- that's a word that I  
04:05 13 can't quantitate. Crash, I can. Certainly populations ebb and  
04:05 14 flow, they go down, they go up. A few years later they  
04:05 15 rebound, they go down, they go up.

04:05 16 This particular population crashed. What I mean by  
04:05 17 that is it fell off the grid -- the cliff. So in one winter,  
04:05 18 about 75, 80 percent of the standing stock was lost, and that  
04:05 19 sort of crash is pretty rare. It's just not customary. And  
04:05 20 usually if a population ebbs and flows, that's because the  
04:05 21 mortalities exceeds the recruitment level here. Well, here we  
04:05 22 just have a crash of the standing stock and we don't have a  
04:05 23 balance between the old guys dropping off and the new guys  
04:06 24 coming on that ebbs flows, so to speak.

04:06 25 So this population is enigmatic. We just don't know

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04:06 1 why.

04:06 2 Q. And we simply don't know why; correct?

04:06 3 A. Simply do not know. We try --

04:06 4 Q. So you're not suggesting or drawing parallels between the  
04:06 5 Pacific herring crash and any *Deepwater Horizon* potential  
04:06 6 impact, given that we don't know what happened to the Pacific  
04:06 7 herring; correct?

04:06 8 A. No, not the crash part. We do know that the 1989 and the  
04:06 9 1999 year class is basically missing. We do know that  
04:06 10 certainly those embryo impacts -- embryo toxicity impacts can  
04:06 11 occur down there at the low part per billion levels.

04:06 12 So we have a mechanism there from the 1989 year  
04:06 13 class. Again, we do not know why the crash of the standing  
04:06 14 stock occurred.

04:06 15 Q. But you're not offering --

04:06 16 A. We desperately tried, by the way. The trustees have spent  
04:06 17 a lot of money trying to figure out just why they crashed and  
04:06 18 they were unsuccessful in determining it.

04:07 19 Q. Understanding that there has been an attempt to under --  
04:07 20 to figure out why the crash, you're certainly not offering any  
04:07 21 opinions in this case that --

04:07 22 A. No.

04:07 23 Q. -- there are any similarities; correct?

04:07 24 A. No. No, not with herring.

04:07 25 MS. KARIS: Your Honor, I have no further questions.

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04:07 1 Thank you, Dr. Rice.

04:07 2 I've been corrected.

04:07 3 **THE COURT:** It looks like you have one.

04:07 4 **MS. KARIS:** With the Court's indulgence.

04:07 5 If we could pull up D-32630-A, please. That's what  
04:07 6 you get when you ask; right?

04:07 7 D-32630-A.

04:08 8 **BY MS. KARIS:**

04:08 9 **Q.** This was a demonstrative you were asked about on direct  
04:08 10 examination.

04:08 11 And I have a question for you, just trying to  
04:08 12 understand it, Dr. Rice. You spoke to what the red line  
04:08 13 indicates, and remind us again what this line indicates.

04:08 14 **A.** It's hovered right over the 1, so that basically if you  
04:08 15 had a TU of greater than 1, that would presumably mean that  
04:08 16 the -- that it's not safe. And if you had TUs less than 1, it  
04:08 17 would presumably be safe.

04:08 18 But in this particular case, you have the population  
04:08 19 there -- excuse me -- that group of animals around .8 toxic  
04:08 20 units that are circled in red, and these are significantly  
04:08 21 different than the controls.

04:08 22 And the vertical axis here is mortality. So roughly  
04:08 23 30 percent of these guys are dying, and the biologists that  
04:08 24 have done this test have identified that as being significantly  
04:08 25 different than the controls. And basically you have an impact

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04:09 1 at a TU of less than 1.

04:09 2 Q. Is this gray line the LC50 value?

04:09 3 A. It would be, yeah.

04:09 4 MS. KARIS: Thank you. Nothing further.

04:09 5 THE COURT: Redirect?

04:09 6 MS. FIDLER: Your Honor, I have a very short  
04:09 7 redirect.

04:09 8 THE COURT: By the way, somebody -- Ms. Karis just  
04:09 9 mentioned an LC50 line. Remind me again what that means.

04:09 10 THE WITNESS: Surely. What it means is that if  
04:09 11 you're to expose a -- in a series of doses, you calculate the  
04:09 12 LC50.

04:09 13 This is very handy when you're comparing the  
04:09 14 toxicity of Toxicant A with Toxicant B with Toxicant C, and  
04:10 15 that's because the statistics about trying to identify where  
04:10 16 that 50 percent mark is -- is the best, so you get the best  
04:10 17 confidence about that number.

04:10 18 So if we were to say Toxicant A is more toxic than --  
04:10 19 than Sample B, you would use the LC50. In contrast, what we're  
04:10 20 doing here is you're trying to find the threshold of effect;  
04:10 21 what is the dose, for example, that will cause a heart problem  
04:10 22 or bent spines or something like that.

04:10 23 THE COURT: Well, what does the 50 mean? 50 what?

04:10 24 THE WITNESS: The 50 means 50 percent.

04:10 25 THE COURT: 50 percent of the animals would die,

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04:10 1 would be adversely affected? What does it mean?

04:10 2 **THE WITNESS:** Yeah, if you could go back a slide,  
04:10 3 I'll just --

04:10 4 **THE COURT:** Put the slide back up.

04:10 5 **THE WITNESS:** It will just take me two seconds. I  
04:10 6 don't know what slide it was. There it is.

04:10 7 So, basically, here you'd look at 50 percent,  
04:10 8 and where it crosses this -- this line -- and the line isn't  
04:11 9 drawn. Then where it crosses is right there, and then you'd  
04:11 10 come down, and basically what it says in this case is that the  
04:11 11 50 percent mortality mark is at a TU of about, I'll say, 1.1.  
04:11 12 Usually we would have that in PAH concentrations. And they'll  
04:11 13 tell you where they -- where -- where you could expect a  
04:11 14 50 percent mortality.

04:11 15 And the point that's used in toxicology, this is  
04:11 16 the point that is the most accurate to measure. And this is  
04:11 17 important if you're measuring the -- the difference between  
04:11 18 different toxicants, like copper or zinc. But --

04:11 19 **THE COURT:** So in your field, in toxicology,  
04:11 20 according to this measurement, it only becomes the -- the  
04:11 21 dosage only becomes relevant if the mortality gets to  
04:11 22 50 percent? Am I stating that wrongly? I'm trying to  
04:11 23 understand what that means.

04:11 24 **THE WITNESS:** You're not quite there, Your Honor.

04:12 25 If we were looking at copper, a copper solution,

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04:12 1 how does that compare -- or a pesticide, Pesticide A and  
04:12 2 Pesticide B -- and this is really where bioassays evolved. Is  
04:12 3 Pesticide A more toxic than Pesticide B? Well, we would  
04:12 4 calculate out the LC50, and it's purely because this  
04:12 5 statistical calculation is more accurate.

04:12 6 **THE COURT:** You're comparing the dosages of two  
04:12 7 different --

04:12 8 **THE WITNESS:** Two different poisons.

04:12 9 **THE COURT:** -- chemicals or poisons. And so what  
04:12 10 dosage of each would get you to your 50 percent mortality  
04:12 11 level? Is that what you're saying?

04:12 12 **THE WITNESS:** Right. And that would allow you, then,  
04:12 13 to say this toxicant is more toxic than the other.

04:12 14 But when we're looking at environmental effects  
04:12 15 and damage assessment studies, we're not interested in that  
04:12 16 value. We're interested in what is a safe value, and that's  
04:12 17 someplace down on the curve here.

04:12 18 So we don't look at LC50s. We're looking at  
04:12 19 what concentration, for example, will stimulate an effect on  
04:13 20 the heart, and we want to know what dose will do that. So that  
04:13 21 then tells us what dose -- what parts per million -- what parts  
04:13 22 per billion are safe.

04:13 23 And so bioassays evolved in this pesticide  
04:13 24 concept, but really we don't quite use it that way.

04:13 25 Does that make sense?

## DR. STANLEY RICE - REDIRECT

04:13 1 THE COURT: Sort of.

04:13 2 REDIRECT EXAMINATION

04:13 3 BY MS. FIDLER:

04:13 4 Q. Let me -- let me try following up on this question.

04:13 5 If you're looking at mortality --

04:13 6 THE COURT: No. Wait, wait, wait. This chart is not  
04:13 7 saying -- it's not that an LC50 value doesn't mean something's  
04:13 8 safe?

04:13 9 THE WITNESS: It doesn't mean anything in this chart,  
04:13 10 Your Honor. It's -- I don't know why it's there. It came out  
04:13 11 of the -- out of the test. We don't -- we normally don't  
04:13 12 calculate it --

04:13 13 THE COURT: That's not something that's for your  
04:14 14 purposes?

04:14 15 THE WITNESS: We don't use it. We're trying to find  
04:14 16 a dose that is --

04:14 17 THE COURT: Okay.

04:14 18 THE WITNESS: -- harmful versus a dose that's safe.

04:14 19 THE COURT: That's good enough. I understand now.

04:14 20 Okay. Go ahead.

04:14 21 BY MS. FIDLER:

04:14 22 Q. I would like to follow up. What percentage levels -- and  
04:14 23 this is an example of mortality. So that would be you're  
04:14 24 looking at an LC, a lethal concentration; correct?

04:14 25 A. Right. And if you notice down here, this is the TUs for



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04:14 1 chronic, and here we have mortality, 30 percent mortality. So  
04:14 2 this is just further evidence that this is not a very safe  
04:14 3 screening procedure, so to speak.

04:14 4 Q. I'd just like to clarify. What does the term "EC50" mean?

04:14 5 A. EC50 is a -- refers usually to some sublethal  
04:14 6 concentration. So it's an environmental effective dose.  
04:14 7 Effective -- what is the effective -- that's the E -- effective  
04:14 8 concentration that would cause a decrease in growth. That's  
04:14 9 how EC is used.

04:14 10 And then, again, that's getting at the concept of  
04:14 11 what doses are protective versus harmful using -- rather than  
04:15 12 mortality, using a different -- a sublethal end point.

04:15 13 Q. And you mentioned earlier that these -- that what was  
04:15 14 chosen as significant -- who chose to represent those levels as  
04:15 15 significant?

04:15 16 A. The people that ran this test for BP, they did this, I  
04:15 17 suppose.

04:15 18 Q. And what -- I'm sorry.

04:15 19 A. The experimenters.

04:15 20 Q. And so what level does -- do toxicologists currently --  
04:15 21 what percentage levels of either effects or mortality are  
04:15 22 generally deemed significant?

04:15 23 A. Well, when it's significantly different from --

04:15 24 THE COURT: Wait one second. I want to help  
04:15 25 somebody.

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04:15 1 Mr. Jarrett's in the box, and he can't figure  
04:15 2 how to raise that screen. Right?

04:15 3 **MR. JARRETT:** Judge, I --

04:15 4 **THE COURT:** Pick it up from the bottom until it snaps  
04:15 5 into place. There you go.

04:15 6 That's why we all went to law school. Somebody  
04:16 7 had to show me that too.

04:16 8 **THE WITNESS:** You have to repeat the question. I  
04:16 9 have no idea where we're at.

04:16 10 **THE COURT:** Sorry about that.

04:16 11 **MS. FIDLER:** Oh, no.

04:16 12 **BY MS. FIDLER:**

04:16 13 **Q.** I just wanted to clarify whether -- you said 50 percent  
04:16 14 isn't really the only level that's considered significant,  
04:16 15 especially when you're looking to be protective.

04:16 16 **A.** No. The main value of the 50 percent mark there is that  
04:16 17 it's the most statistically accurate estimate. But, really, if  
04:16 18 we're talking about what a safe dose is, we'd go to the EC50s,  
04:16 19 for example, or EC20. We'd go down the levels. Because the  
04:16 20 objective then is not to compare the poisons, but to determine  
04:16 21 the doses that are relatively safe.

04:16 22 **Q.** So when you say EC20, are you saying, in effect, at  
04:16 23 20 percent?

04:16 24 **A.** Right. Once you get below 20, for example, it's getting  
04:16 25 rather difficult to get it statistically significant different

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04:16 1 from the controls.

04:16 2 Q. Thank you.

04:16 3 And I meant to clarify that, again, on your redirect.

04:17 4 MS. FIDLER: Can we pull up 12237.005. This is  
04:17 5 TREX-12237.05.

04:17 6 BY MS. FIDLER:

04:17 7 Q. This is the OSAT report that counsel was referencing in  
04:17 8 the beginning of your cross-examination.

04:17 9 Okay. We'll come back to that.

04:17 10 There were a lot of questions about Dr. Incardona's  
04:17 11 work. And I just wanted to ask just two questions on  
04:17 12 Incardona.

04:17 13 Does the control mortality rate in Dr. Incardona's  
04:17 14 study call into question the results of the study, in your  
04:17 15 opinion?

04:17 16 A. It's a little bit of a red flag, to be honest.

04:17 17 But the most important thing is whether you get a  
04:17 18 dose response curve. So if I saw a control mortality, let's  
04:18 19 say, above 20 percent, I really want to have a hard look at  
04:18 20 what the doses are and the response. Do they get -- does the  
04:18 21 response get increasingly worse with increasing concentration.  
04:18 22 And, in fact, that's what happens in the Incardona study. So  
04:18 23 it meets that demand.

04:18 24 You have to subtract more -- more of the controls,  
04:18 25 and so it actually begins to hinder the precision of the test,

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04:18 1 but it doesn't damage it so much that it's not worthwhile  
04:18 2 anymore.

04:18 3 Q. And counsel for BP raised several issues with regard to  
04:18 4 the loss of some samples in that study. Is it -- is it typical  
04:18 5 for researchers to report concentrations for all of their  
04:18 6 exposure levels?

04:18 7 A. No. I think that that would be the ideal goal.  
04:18 8 Certainly, if you're going to be in a litigative (verbatim)  
04:18 9 atmosphere, it puts more pressure on that. But very few  
04:19 10 experiments have every single dose measured. We've been for it  
04:19 11 in our laboratory and in the litigation type of arena. So we  
04:19 12 tend to do -- we have done -- all of our doses pretty much have  
04:19 13 fall in that category.

04:19 14 And like I say, to be a hundred percent full  
04:19 15 standard, you'd want that, but it's seldom achieved.  
04:19 16 Several -- a lot of BP tests, for example, don't have all the  
04:19 17 doses analyzed. It's --

04:19 18 **BY MS. FIDLER:**

04:19 19 Q. And did --

04:19 20 A. -- kind of common not to.

04:19 21 Q. And did -- did Dr. Incardona have the concentration that  
04:19 22 you feel was necessary to accurately describe the  
04:19 23 concentrations he found?

04:19 24 A. Well, the bare minimum would be having that stock  
04:19 25 concentration that you ran the dilutions off of. It's the

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04:19 1 absolute bare minimum. He -- he couldn't publish the test  
04:19 2 without that.

04:19 3 The other tests were done -- for the other two  
04:19 4 species were done at a much higher standard -- analytically, I  
04:19 5 should say. Biologically, they were all done at a very high  
04:20 6 standard.

04:20 7 Q. Counsel for BP also raised questions regarding Dr. Page's  
04:20 8 criticism of your work. Do you recall those questions?

04:20 9 A. I'm not sure about the questions. I certainly recall  
04:20 10 Dr. Page and the series of critical papers directed at our  
04:20 11 studies, yes.

04:20 12 Q. And you mentioned that you had responded to those. Has  
04:20 13 Dr. Page ever tried to duplicate your work?

04:20 14 A. To my knowledge, Dr. Page, in a series of those papers,  
04:20 15 has -- has never repeated -- never done an original study in  
04:20 16 the laboratory, in his laboratory toxicity tests. What he's  
04:20 17 done is critically read the papers and then basically surmise  
04:20 18 that there's an ammonia toxicity problem or there's a bacterial  
04:20 19 problem, all these sort of -- so he raises issues.

04:20 20 But in our studies, we'll always have controls, for  
04:20 21 example, that would take care of those sort of things. We've  
04:20 22 never found merit with any of his arguments. We've certainly  
04:21 23 responded to his arguments.

04:21 24 As a matter of fact, Incardona in a way responds to  
04:21 25 one of his arguments. To get around the problem of bacteria,

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04:21 1 for example, which is a criticism of one of our tests, he used  
04:21 2 antibiotics in one of his tests with the yellowfin tuna. So he  
04:21 3 ran a test with and another replica test without antibiotics.  
04:21 4 He got the same results.

04:21 5 And he did that for the sole purpose, basically, of  
04:21 6 beating back the criticism of -- say, he had a bacterial  
04:21 7 problem, and that was the reason why he had the -- the low  
04:21 8 survival rates or something of that sort. Well, he proved in  
04:21 9 that test, for example, with -- with the antibiotics, that that  
04:21 10 wasn't the case.

04:21 11 Q. Who paid for that work; do you know?

04:21 12 A. Yes, I do. Those people were all Exxon contractors.

04:21 13 And the reason why they're continuing to raise these  
04:21 14 issues, Exxon still has litigative interests in Alaska. They  
04:21 15 still are potentially liable for basically \$100 million in a  
04:22 16 reopener clause.

04:22 17 Q. Returning to the OSAT issue. You were shown an OSAT  
04:22 18 document -- and OSAT is from the Unified Command. To your  
04:22 19 knowledge, was the Unified Command ever trying to assess  
04:22 20 long-term harm to aquatic life?

04:22 21 A. No. I think what they are primarily doing is directing  
04:22 22 the response efforts. They would have been using these -- this  
04:22 23 sort of data for -- for actionable response options. They  
04:22 24 weren't into damage assessment. That's part of NRDA and also  
04:22 25 part of NOAA's responsibility, at least for the fisheries and

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04:22 1 fish and that sort of thing, and that wasn't what that was.

04:22 2 **MS. FIDLER:** I have no further questions, Your Honor.  
04:22 3 Thank you very much.

04:22 4 **THE COURT:** All right. Thank you, Doctor.

04:22 5 **THE WITNESS:** Yes, sir.

04:22 6 **THE COURT:** The government can call its next witness.  
04:23 7 Who is the next witness?

04:23 8 **MS. HIMMELHOCH:** Captain VanHaverbeke, Your Honor.

04:23 9 **THE COURT:** Okay.

04:23 10 (WHEREUPON, **CAPTAIN MARK VANHAVERBEKE**, having been  
04:23 11 duly sworn, testified as follows:)

04:23 12 **THE DEPUTY CLERK:** Please state your full name and  
04:23 13 correct spelling for the record.

04:24 14 **THE WITNESS:** Captain Mark VanHaverbeke, United  
04:24 15 States Coast Guard, retired.

04:24 16 **MR. ROBERS:** May we proceed, Your Honor?

04:24 17 **THE COURT:** Sure.

04:24 18 **MR. ROBERS:** Brandon Robers for the United States.

04:24 19 **DIRECT EXAMINATION**

04:24 20 **BY MR. ROBERS:**

04:24 21 **Q.** Captain VanHaverbeke, please introduce yourself to the  
04:24 22 Court.

04:24 23 **A.** Again, it's Captain Mark VanHaverbeke, United States Coast  
04:24 24 Guard, retired.

04:24 25 **Q.** Were you asked to serve as an expert for the United States

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04:24 1 in this case?

04:24 2 A. Yes.

04:24 3 Q. And what were you asked to do?

04:24 4 A. To opine on spill response, spill response research and  
04:24 5 development, and certain claims by BP in terms of development  
04:24 6 of new technologies that have improved our spill response  
04:24 7 capabilities.

04:24 8 Q. And what are your areas of expertise as they relate to  
04:24 9 this case?

04:24 10 A. Spill response and spill response research and  
04:24 11 development.

04:24 12 Q. Captain VanHaverbeke, as part of your work on this case,  
04:25 13 did you prepare a summary of your professional experience?

04:25 14 A. Yes.

04:25 15 MR. ROBERS: Please pull up D-33751.

04:25 16 BY MR. ROBERS:

04:25 17 Q. Is this the summary?

04:25 18 THE COURT: I should have said something.

04:25 19 Two things. First of all -- excuse me. I guess  
04:25 20 I don't have to say it; but for each of these expert witnesses,  
04:25 21 unless I say otherwise, we'll be proceeding. You can assume  
04:25 22 that I've denied the *Daubert* motion with the under -- same  
04:25 23 understanding we had in the past with past witnesses.

04:25 24 And also, I should have asked Ms. Kirby --  
04:25 25 Anadarko, I haven't been asking you all if you had questions



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04:25 1 for any of these witnesses. So unless you speak up, I'm going  
04:25 2 to assume you have no questions. Fair enough?

04:25 3 **MS. KIRBY:** Fair enough.

04:25 4 **THE COURT:** Okay. All right.

04:25 5 I'm sorry. Go ahead, Mr. Robers.

04:25 6 **BY MR. ROBERS:**

04:25 7 **Q.** Captain VanHaverbeke, is this the -- the summary of your  
04:25 8 professional experience that you prepared?

04:25 9 **A.** Yes.

04:25 10 **Q.** Is this a fair and accurate representation of your  
04:26 11 experience as it relates to your work in this case?

04:26 12 **A.** Yes.

04:26 13 **Q.** I'd like to briefly talk about your educational  
04:26 14 background. What degrees, if any, do you hold?

04:26 15 **A.** Bachelor's Degree in naval architecture and marine  
04:26 16 engineering from the United States Coast Guard Academy; and two  
04:26 17 Master's, one in naval architecture and marine engineering, and  
04:26 18 the second one in mechanical engineering from the University of  
04:26 19 the Michigan.

04:26 20 **Q.** And were all these degrees earned during your service to  
04:26 21 the United States Coast Guard?

04:26 22 **A.** Yes.

04:26 23 **Q.** Where are you currently employed?

04:26 24 **A.** I'm with the Coast Guard Research and Development Center.

04:26 25 **Q.** And how long have you worked at the Coast Guard Research

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04:26 1 and Development Center?

04:26 2 A. I started there as a civilian employee in 2006, January of  
04:26 3 2006.

04:26 4 Q. And what is your title?

04:26 5 A. Research engineer.

04:26 6 Q. What are your responsibilities as a research engineer?

04:26 7 A. The Coast Guard Research and Development Center supports  
04:26 8 the operational Coast Guard in all our missions. So we cover  
04:27 9 everything from search and rescue, marine pollution, maritime  
04:27 10 security, navigation safety, all the missions. And that's  
04:27 11 basically what I support.

04:27 12 Q. Please give a few examples of some oil spill  
04:27 13 response-related research efforts that you've been a part of.

04:27 14 A. When I started there in 2006, I was tasked with doing a  
04:27 15 systems analysis of spill response, which defined the system  
04:27 16 and then evaluated it, looking for the best opportunities to  
04:27 17 invest research dollars to improve the overall response.

04:27 18 When we completed that, we then developed a strategic  
04:27 19 plan for spill response for Coast Guard R&D, taking into  
04:27 20 account other factors besides just the systems analysis. Once  
04:27 21 we completed that, we -- we then started going after what he  
04:27 22 consider to be the best investment of our dollars, which was  
04:28 23 submerged oil.

04:28 24 The U.S. periodically has spills where the oil sinks  
04:28 25 and we have a real problem finding the oil and then recovering

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04:28 1 it. So there's really not a whole lot of research going on in  
04:28 2 that area. We have relatively limited dollars, so we invested  
04:28 3 in that instead of some of the other areas. We developed a  
04:28 4 number of processes or devices which might find it, for  
04:28 5 example, laser fluorosensor that can detect oil in the water  
04:28 6 column.

04:28 7 I personally looked at sonar and its application. We  
04:28 8 had some others, like gas chromatography, that we tried. When  
04:28 9 we got done with that portion of the research, we then started  
04:28 10 looking at different options on how to actually recover the  
04:28 11 oil.

04:28 12 And then once we completed that project, the -- the  
04:28 13 focus has kind of shifted to the Arctic because there's a lot  
04:29 14 of concern that traffic and oil development is going to  
04:29 15 increase up there and we need to get better prepared for oil  
04:29 16 spill response.

04:29 17 Q. Have you ever published in the field of oil spill response  
04:29 18 research and development?

04:29 19 A. Yes.

04:29 20 Q. Can you describe the publication?

04:29 21 A. In -- I published the results of our systems analysis for  
04:29 22 the International Oil Spill Conference in 2008. I coauthored a  
04:29 23 paper on our submerged oil research, and I also was listed as a  
04:29 24 coauthor on a paper on the alternative response technology  
04:29 25 effort that we undertook at Houma.

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04:29 1 Q. Have you attended professional conferences focused on oil  
04:29 2 spill response?

04:29 3 A. Yes. I -- I've attended a number of International Oil  
04:29 4 Spill conferences over the years through my career. I attended  
04:29 5 Clean Gulf a few times. Went to some inland -- Inland Oil  
04:29 6 Spill conferences, some Chemical Response conferences.

04:30 7 Q. What did you do before joining the Coast Guard's Research  
04:30 8 and Development Center?

04:30 9 A. I spent 30 years on active duty as a Coast Guard officer.

04:30 10 Q. And did you prepare a slide summarizing your work in the  
04:30 11 Coast Guard relevant to the topics you'll be offering opinions  
04:30 12 on in this case?

04:30 13 A. Yes.

04:30 14 MR. ROBERS: Please pull up D-33752.

04:30 15 BY MR. ROBERS:

04:30 16 Q. Is this the summary you just referenced?

04:30 17 A. Yes.

04:30 18 Q. Please describe some of the roles you've held during your  
04:30 19 30 years of service in the U.S. Coast Guard that relate to your  
04:30 20 expert work in this case.

04:30 21 A. Well, starting at the bottom, after I completed my initial  
04:30 22 tour afloat on a Coast Guard cutter, I joined the staff of the  
04:30 23 Eleventh Coast Guard District in Long Beach, in the marine  
04:30 24 environmental protection and the port safety branch. My role  
04:30 25 at that point was helping the district advise the FOSCs on

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04:30 1 basically giving advice and guidance and oversight.

04:31 2 I also supported my boss, who was the cochair of the  
04:31 3 Regional Response Team, in -- in his duties as cochair.

04:31 4 Following that, I went to Marine Safety Office  
04:31 5 Chicago, where I had various duties, but I spent a little over  
04:31 6 half my time as the court operations officer. So I was  
04:31 7 directly responsible for spill prevention and response.

04:31 8 After that, I went to grad school and went through a  
04:31 9 couple of technical tours. But I went back out in the field in  
04:31 10 1991 as the executive officer of Marine Safety Office Buffalo.  
04:31 11 And in that position I was the deputy FOOSC. And from that I  
04:31 12 actually flected up or moved up to being the commanding officer  
04:31 13 in the FOOSC.

04:31 14 That was at a time when we were basically  
04:31 15 implementing OPA 90. We started planning and action in a  
04:31 16 community setting. As odd as it seems now, prior to OPA 90,  
04:32 17 the Coast Guard used to develop its spill response plan by  
04:32 18 itself, in-house.

04:32 19 *Exxon Valdez* showed us that that's not the way to go.  
04:32 20 So we started -- we developed an area committee. It included  
04:32 21 other federal, state, and local agencies in planning for a  
04:32 22 response. We published our first plan under that -- I don't  
04:32 23 remember whether it was '90 -- I think in '93.

04:32 24 But the big issue that we still had was how do you  
04:32 25 actually manage what may be a very large organization that has

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04:32 1 to come together for a spill. And the Erie County emergency  
04:32 2 manager suggested we look at the incident command system, which  
04:32 3 we did, and we found out about, also, Unified Command, and then  
04:32 4 actually implemented that as the way we were going to do it.

04:32 5 And we had a full-scale exercise before I left in  
04:32 6 '95. Exercise of the Unified Command was very successful. It  
04:33 7 showed the power of it.

04:33 8 In fact, the -- the pipeline owner that played the  
04:33 9 responsible party said he came into the exercise expecting --  
04:33 10 well, thinking that trying to manage an oil spill by committee  
04:33 11 was the dumbest idea he ever heard of. But then when he saw  
04:33 12 how Unified Command brings everybody together, you see the same  
04:33 13 common operative picture, hear everybody else's concerns. It  
04:33 14 really made for very powerful decision making.

04:33 15 So I left there and went to headquarters. I had two  
04:33 16 major projects I worked on while I was there. One was  
04:33 17 prevention through people, which was trying to inculcate the  
04:33 18 marine industry with the concept that safety really starts with  
04:33 19 people, from the boardroom to the deck plates. We can put all  
04:33 20 the rigs in one place, but the people have to make sure we're  
04:33 21 safe.

04:33 22 And then the second one was risk-based decision  
04:33 23 making, which became foundational in the way the Coast Guard  
04:33 24 goes about addressing any kind of risky situation, if you will.

04:34 25 Following that, I went back out into the field in

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04:34 1 2000 as the commanding officer at FOSC at NSO Providence. By  
04:34 2 that point the Coast Guard headquarters had ordered the  
04:34 3 implementation of ICS and Unified Command throughout the Coast  
04:34 4 Guard response community. And my team there had already run  
04:34 5 several major events using Incident Command.

04:34 6 So I took a step back, and as the outsider, it looked  
04:34 7 to me like while we set up the system, we still had some  
04:34 8 concerns with certain environmental sensitivities. So we  
04:34 9 studied that and found out we had one of two nesting islands  
04:34 10 for endangered bird within Buzzards Bay, which is a national  
04:34 11 estuary. So following that exercise, we put together an island  
04:34 12 bird, whatever specific -- a species-specific response plan in  
04:34 13 case there was a spill that threatened the -- the birds.

04:35 14 And the year after I left under Admiral Landry, or  
04:35 15 Captain Landry at the time, they did have a spill and had to  
04:35 16 use that plan.

04:35 17 In 2002, I went to the First Coast Guard District  
04:35 18 where I was the chief of marine safety responsible for the  
04:35 19 Coast Guard's environmental response programs, everything from  
04:35 20 the Acadian border, where I had to work with my Acadian  
04:35 21 counterparts, to southern New Jersey. And as that, I provided  
04:35 22 oversight and guidance to all the FOSCs. I also was the  
04:35 23 cochair of regional response teams 1 and 2, my -- my cochair  
04:35 24 being the EPA.

04:35 25 Q. You mentioned -- you used the term "FOSC." What does that

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04:35 1 stand for?

04:35 2 A. The federal on-scene coordinator. He's the person, the  
04:35 3 federal person in charge of an oil spill response.

04:35 4 Q. And how much time total did you spend in your career  
04:35 5 serving as either the FOSC or deputy FOSC?

04:35 6 A. Six years.

04:36 7 Q. You also mentioned regional response teams, or RRTs. How  
04:36 8 much time in your career did you spend serving on or working on  
04:36 9 RRTs?

04:36 10 A. I -- I worked the RRT first when I was in Long Beach in  
04:36 11 the late '70s. When I was FOSC or deputy FOSC, I would attend  
04:36 12 regional response team meetings so that I would get to know  
04:36 13 the -- the various agencies, the representatives who were  
04:36 14 there.

04:36 15 And then it was the three years when I was at the  
04:36 16 First Coast Guard District as chief of marine safety when I was  
04:36 17 the cochair.

04:36 18 Q. And what were your responsibilities as cochair of the RRT?

04:36 19 A. The RRTs are set up under the National Contingency Plan.  
04:36 20 There's a National Response Team that provides us guidance, and  
04:36 21 then we have responsibilities for taking that guidance. And we  
04:36 22 have our own contingency plans for the area -- for the region,  
04:37 23 regional response team.

04:37 24 And we provide advice and guidance to the FOSC. So,  
04:37 25 for example, our contingency plan includes preauthorization for



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04:37 1 use of dispersants and burning in the event of a spill. And if  
04:37 2 there was a spill of significant size, we might convene the RRT  
04:37 3 to provide the FOSC support and guidance.

04:37 4 Q. Were the RRTs that you served on similar types of  
04:37 5 organizations as the RRT that was involved in the *Deepwater*  
04:37 6 *Horizon* response?

04:37 7 A. Yes. It's essentially identical. They're set up under  
04:37 8 the National Contingency Plan. They include the same  
04:37 9 15 federal agencies. We all get the same guidance and  
04:37 10 direction from the plan, the National Contingency Plan, and  
04:37 11 from the National Response Team.

04:37 12 Q. During your Coast Guard career, did you ever have reason  
04:37 13 to consider the use of dispersants in oil spill response  
04:37 14 operations?

04:37 15 A. Considered it, yes. When I was in the Eleventh District,  
04:38 16 at that point in time, frankly, the consideration was the  
04:38 17 toxicity levels were too high. So generally in the U.S. they  
04:38 18 were not well-considered.

04:38 19 When I was in the Great Lakes, we basically took them  
04:38 20 off the table, the concern there being dispersants put the oil  
04:38 21 into the water column. And in the Great Lakes, the water  
04:38 22 column, that's the drinking water supply, so we couldn't do  
04:38 23 that.

04:38 24 When I went to -- when I got to Providence,  
04:38 25 dispersant toxicity had been brought down to a level where they

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04:38 1 were now considered to be a viable option. And both the RRT,  
04:38 2 RRT 1, which is what Providence was under, had authorized and  
04:38 3 published preapproval guidelines, and our contingency plan  
04:38 4 included the possibility of using that.

04:38 5 But with that said, my belief for the State of Rhode  
04:39 6 Island told me that if you look at the National Contingency  
04:39 7 Plan, you --

04:39 8 **MR. BROCK:** Your Honor, I don't mean to interrupt.  
04:39 9 I'm sorry.

04:39 10 I object to this on hearsay, what he was told by  
04:39 11 someone in Rhode Island about dispersants.

04:39 12 **MR. ROBERS:** The witness is only speaking to his  
04:39 13 qualifications and experience in the field and not offering it  
04:39 14 for its truth.

04:39 15 **THE COURT:** Yeah, I think he -- I think he's just  
04:39 16 giving us some -- as I understand, it's his background, but  
04:39 17 maybe we can see if we can make it more a question and answer.  
04:39 18 Okay?

04:39 19 **MR. BROCK:** I apologize for interrupting.

04:39 20 **THE COURT:** Go ahead.

04:39 21 **THE WITNESS:** What he told me was, even though we had  
04:39 22 preapproval under his authority, under the National Contingency  
04:39 23 Plan, he was going to basically deny the use in the Rhode  
04:39 24 Island waters.  
25

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04:39 1 **BY MR. ROBERS:**

04:39 2 **Q.** We'll turn now to the *Deepwater Horizon* response. Were  
04:39 3 you involved in the *Deepwater Horizon* response efforts?

04:39 4 **A.** Yes.

04:39 5 **Q.** And in what capacity?

04:39 6 **A.** I was part of the alternative response technology effort  
04:39 7 down in Houma at the incident command post. And when I wasn't  
04:40 8 down there, I was part of IATAP, the Interagency Technology  
04:40 9 Assessment Program, run by the National Incident Commander  
10 while I was back at the Coast Guard R&D center.

04:40 11 **MR. ROBERS:** Your Honor, the United States offers  
04:40 12 Captain Mark VanHaverbeke as an expert in oil spill response  
04:40 13 and oil spill response research and development.

04:40 14 **MR. BROCK:** No objection.

04:40 15 **THE COURT:** Okay. No other questions, okay. Without  
04:40 16 objection, he's admitted -- he's accepted, not admitted.  
04:40 17 Admitted and accepted. It's getting late.

04:40 18 **BY MR. ROBERS:**

04:40 19 **Q.** Captain VanHaverbeke, let's turn to your expert work in  
04:40 20 this case. Are you being compensated for your work in this  
04:40 21 case?

04:40 22 **A.** I'm only receiving my salary as a civilian employee.

04:40 23 **Q.** Did you prepare any reports?

04:40 24 **A.** Yes.

04:40 25 **Q.** Please pull up TREX-013513.

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04:41 1 Captain VanHaverbeke, is this a copy of your Round 1  
04:41 2 expert report submitted August 15th, 2014?

04:41 3 A. Yes.

04:41 4 Q. Please pull up TREX-013514.

04:41 5 Captain VanHaverbeke, is this a copy of your Round 2  
04:41 6 expert report submitted September 12th, 2014?

04:41 7 A. Yes.

04:41 8 Q. Please pull up TREX-013515.

04:41 9 Captain VanHaverbeke, is this a copy of your Round 3  
04:41 10 expert report submitted September 26th, 2014?

04:41 11 A. Yes.

04:41 12 Q. Since submitting these reports, have you revised any of  
04:41 13 the calculations that they contain?

04:41 14 A. Yes.

04:41 15 Q. Please pull up D-33775.

04:41 16 I'm showing you a slide that contains TREX-233890.1  
04:41 17 and TREX-233890.3. Are these documents, the revision and  
04:42 18 errata, associated with your report?

04:42 19 A. Yes.

04:42 20 Q. What was -- now turning to the errata, this would be the  
04:42 21 document on the right of the screen. What was the purpose of  
04:42 22 the errata?

04:42 23 A. My Round 2 report included the wrong values for how much  
04:42 24 was skimmed, burned, and dispersed. So basically, I -- I --  
04:42 25 when that was pointed out, we corrected it. My values

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04:42 1 included, in the total volume, the amount that was directly  
04:42 2 recovered, which was in error.

04:42 3 Q. And what was the purpose of the revision, this being the  
04:42 4 document on the left, TRES-233890.3?

04:42 5 A. Last week the Court determined what the total volume was;  
04:42 6 and based on that, I revised the numbers that I could.

04:42 7 Q. Now, the errata contains two values that the revision does  
04:42 8 not. Why haven't you offered updated values for the amount  
04:42 9 chemically dispersed and the amount of oil deemed  
04:43 10 unrecoverable?

04:43 11 A. The values come from the government's third interrogative,  
04:43 12 which is based on the oil budget calculator. The oil budget  
04:43 13 calculator starts with an assumed daily flow rate from the  
04:43 14 well.

04:43 15 We no longer have an assumed daily rate, so I can't  
04:43 16 figure out what the rest of the values -- those other two  
04:43 17 values are. And, unfortunately, the numbers -- the calculator  
04:43 18 uses -- it recognizes that there is uncertainty in the values,  
04:43 19 and so it has -- uses a statistical analysis to come up with  
04:43 20 what has been chemically dispersed and what's unavailable for  
04:43 21 recovery.

04:43 22 So I couldn't -- I'm not comfortable trying to  
04:43 23 replicate that without having somebody rerun the calculator,  
04:43 24 and I don't know that that's possible without a daily discharge  
04:43 25 rate.

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04:43 1 Q. Okay. And I'll just briefly correct the record. The  
04:44 2 revision to your report is TREN No. 233890.1.

04:44 3 MR. BROCK: I'll apologize. You're calling the  
04:44 4 revision the January 19th, 2015 report?

04:44 5 MR. ROBERS: Yes.

04:44 6 BY MR. ROBERS:

04:44 7 Q. The revision to your report submitted January 19th is TREN  
04:44 8 No. 233890.1. Is that correct, Captain VanHaverbeke?

04:44 9 A. Yes.

04:44 10 Q. Does the difficulty that you just described calculating  
04:44 11 those two numbers, the amount chemically dispersed and the  
04:44 12 amount unavailable for recovery, exist with respect to your  
04:44 13 calculations for the amount skimmed and the amount burned?

04:44 14 A. No. The amount skimmed and the amount burned were  
04:44 15 established separate from the calculator. The amount burned  
04:44 16 was estimated by the burn teams. The amount skimmed was  
04:45 17 essentially as oily liquids were brought ashore, they measured  
04:45 18 how much they brought ashore and they assumed a certain value  
04:45 19 for how much of it was oil versus water.

04:45 20 Q. Are all of the revisions you made to the reports contained  
04:45 21 on the two pages shown in this demonstrative?

04:45 22 A. Yes.

04:45 23 Q. Do any of revisions alter any of the opinions that you  
04:45 24 offer in your experts -- expert reports in this case?

04:45 25 A. No.

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04:45 1 Q. And do these reports, including the errata and the  
04:45 2 revisions, contain the opinions that you intend to offer in  
04:45 3 this matter and the bases for those opinions?

04:45 4 A. Yes.

04:45 5 MR. ROBERS: Your Honor, I offer  
04:45 6 Captain VanHaverbeke's expert reports, including the revision  
04:45 7 and errata, Exhibits 013513, 013514, 013515, and 233890 into  
04:45 8 evidence.

04:45 9 THE COURT: Okay. We'll deal with those when we  
04:45 10 marshal the exhibits.

04:45 11 MR. ROBERS: Yes, Your Honor.

04:45 12 BY MR. ROBERS:

04:45 13 Q. Captain VanHaverbeke, do you adopt the contents of these  
04:46 14 reports as your testimony in this case?

04:46 15 A. Yes.

04:46 16 Q. Let's begin by discussing your conclusions concerning  
04:46 17 innovation in research and development. Have you prepared a  
04:46 18 summary of the conclusions you'll be discussing in your  
04:46 19 testimony today?

04:46 20 A. Yes.

04:46 21 MR. ROBERS: Please bring up D-33753.

04:46 22 BY MR. ROBERS:

04:46 23 Q. Is this the summary you just referenced?

04:46 24 A. Yes.

04:46 25 Q. And you'll be discussing three opinions; right?

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04:46 1 A. Yes.

04:46 2 Q. And what are they?

04:46 3 A. Oil spill research and development is an ongoing process.  
04:46 4 New or innovative technologies and techniques developed  
04:46 5 *Deepwater* -- during *the Deepwater Horizon* were developed as a  
04:46 6 part of the Unified Command and the management team as a  
04:46 7 whole -- excuse me -- and response relied primarily on existing  
04:46 8 technologies.

04:46 9 Q. Now, prior to the *Deepwater Horizon* response, were there  
04:46 10 organizations that conducted research and development on oil  
04:46 11 spill response-related technologies?

04:47 12 A. Yes.

04:47 13 Q. Please describe a few of these organizations.

04:47 14 A. Well, I need to start with the Coast Guard R&D center.  
04:47 15 We've been doing spill response research since the 1970s, early  
04:47 16 '70s. Minerals Management Service, now Bureau of Safety and  
04:47 17 Environmental Enforcement, has had a very strong program  
04:47 18 through most of that.

04:47 19 EPA has a program. NOAA does a grant program.  
04:47 20 Right now they've got the Coastal Response Research Center out  
04:47 21 at the University of New Hampshire under grant. And there's  
04:47 22 quite a few other federal agencies doing oil spill-related  
04:47 23 response.

04:47 24 In fact, part of OPA 90 directed the federal  
04:47 25 government to coordinate its research and report to Congress



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04:47 1 every other year. And coordinating that is an organization  
04:47 2 called ICCOPR, Interagency Coordinating Committee on Oil  
04:47 3 response (verbatim) -- I don't recall the exact name --  
04:48 4 Research Programs. But -- so that -- that's on the federal  
04:48 5 side.

04:48 6 I know the State of Texas has got a strong  
04:48 7 program. The State of California has done a lot of research  
04:48 8 over the years. OSROs, ExxonMobil, a lot of organizations have  
04:48 9 been doing it. The Canadians have got a very strong research  
04:48 10 program. And SINTEF and some other organizations in Europe do  
04:48 11 a lot of research. So it's -- there's a lot of people that,  
04:48 12 over the years, have done significant research.

04:48 13 And there's private industry. A lot of the  
04:48 14 actual mechanics of what goes on out there are developed by  
04:48 15 entrepreneurs who are trying to develop a better product.

04:48 16 Q. Now, prior to the *Deepwater Horizon* spill, did these  
04:48 17 organizations develop technologies and techniques similar to  
04:48 18 the ones that were deployed during the *Deepwater Horizon*  
04:48 19 response?

04:48 20 A. Yes.

04:48 21 Q. Please give some examples.

04:48 22 A. ERMA, which maintained the COP, the Common Operating  
04:48 23 Picture, was developed by CRRC. And then skimming, burning,  
04:49 24 and dispersing have all been developed prior to the *Deepwater*  
04:49 25 *Horizon*.

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04:49 1 Q. Did you prepare slides to help illustrate those examples?

04:49 2 A. Yes.

04:49 3 MR. ROBERS: Please bring up D-33756.

04:49 4 BY MR. ROBERS:

04:49 5 Q. Here we're looking at a slide showing TREN-242543. It's a  
04:49 6 document entitled "Interagency Coordinating Committee on Oil  
04:49 7 Pollution Research Biannual Report" for the years 2008/2009,  
04:49 8 dated December 2009.

04:49 9 Did you rely on this document in forming your  
04:49 10 opinions?

04:49 11 A. Yes.

04:49 12 Q. And what is this document?

04:49 13 A. This is, again, ICCOPR, the federal group that does  
04:49 14 research and is required to report to Congress biannually.  
04:49 15 This is their 2009 report.

04:49 16 Q. And how does the information in this report inform your  
04:49 17 opinions related to oil spill response?

04:49 18 A. It actually, in 2009, included a section on ERMA.

04:50 19 Q. And is there a specific passage you find particularly  
04:50 20 relevant?

04:50 21 A. Yes.

04:50 22 MR. ROBERS: Please bring up D-333757, a slide  
04:50 23 showing a call-out from TREN-242543.21.

04:50 24 BY MR. ROBERS:

04:50 25 Q. What is the significance of this passage?

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04:50 1 A. It basically tells -- talks about ERMA and what the  
04:50 2 development was at that stage and what it was supposed to do.  
04:50 3 This was October 2009. We actually had started working on it  
04:50 4 in 2007. And I was directly involved because Dr. Nancy Kinner,  
04:50 5 who runs the CRRC, and I had a conversation, and I told her  
04:50 6 what I would -- as former FOSC, would like this system to be  
04:50 7 able to do.

04:50 8 So she invited me to be a part of the development  
04:50 9 team. We initially did it for Portsmouth Harbor in  
04:50 10 New Hampshire and developed the ability to expand it out over  
04:50 11 time. But the Spill of National Significance exercise done in  
04:50 12 March of 2010, a month before the *Deepwater Horizon*, rolled out  
04:51 13 ERMA as its fully developed and capable program.

04:51 14 Q. And just for the record, what does CRRC stand for?

04:51 15 A. Again, it's the Coastal -- Coastal Response Research  
04:51 16 Center.

04:51 17 Q. Have you prepared another example of pre-spill  
04:51 18 response-related research and development?

04:51 19 A. Yes.

04:51 20 MR. ROBERS: Please bring up D-33761.

04:51 21 BY MR. ROBERS:

04:51 22 Q. We're looking at a slide showing TRES-23990.1 and  
04:51 23 TRES-230990.2, the first two pages of a document dated  
04:51 24 March 2013, entitled "United States Coast Guard Oil Spill  
04:51 25 Response Offshore In-Situ Burning Operations Manual."

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04:51 1 Did you rely on this document in forming your  
04:51 2 opinions?

04:51 3 A. Yes.

04:51 4 Q. And how does this document inform your opinions?

04:51 5 A. This -- this publication was put together by the Coast  
04:52 6 Guard R&D center following almost a decade of research relating  
04:52 7 to burning. And the date is March of 2003.

04:52 8 But what they did was took all the lessons learned  
04:52 9 over that decade, essentially the spill tactics and other  
04:52 10 guidance, and put them together in a manual so that federal  
04:52 11 on-scene coordinators had this guidance and could use it in the  
04:52 12 event of a spill when they needed to -- or had the capability  
04:52 13 and the time to go out and burn oil.

04:52 14 Q. Did you prepare any other examples of pre-spill  
04:52 15 response-related research and development?

04:52 16 A. Yes.

04:52 17 **MR. ROBERS:** Please bring up D-33770.

04:52 18 **BY MR. ROBERS:**

04:52 19 Q. We're looking at a slide showing TREX-230012, a document  
04:52 20 titled "Oil Spill Dispersants: Efficacy and Effects" from the  
04:52 21 National Research Council in 2005.

04:52 22 Did you rely on this document in forming your  
04:53 23 opinions?

04:53 24 A. Yes.

04:53 25 Q. And what is the document?

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04:53 1 A. This is a document that was put together by a team that  
04:53 2 the National Academy of Sciences put together at the request of  
04:53 3 the Coast Guard and some other agencies.

04:53 4 And by way of background, the Coast Guard was  
04:53 5 considering requiring large ships -- or ships carrying large  
04:53 6 amounts of oil to have dispersant application capability as  
04:53 7 part of their response plans.

04:53 8 Before we did that, we needed to make sure that, A,  
04:53 9 we had a good handle on how effective dispersants were and, B,  
04:53 10 what the environmental risks were with dispersants. So we  
04:53 11 hired the National Academy of Sciences to do the study, and  
04:53 12 this was the publication they put out.

04:53 13 Q. And how does the information in this report inform your  
04:53 14 opinion?

04:53 15 A. It provides some information relating to efficacy and  
04:54 16 effects of dispersants.

04:54 17 Q. Is there a specific passage you find particularly  
04:54 18 relevant?

04:54 19 A. Yes.

04:54 20 MR. ROBERS: Please bring up D-33762, the slide  
04:54 21 containing call-outs from TREN-230012.19 and TREN-230012.87.

04:54 22 BY MR. ROBERS:

04:54 23 Q. What are the significance of these passages?

04:54 24 A. Well, the first passage, if you look at the last sentence,  
04:54 25 it speaks to the way things generally have been, and that's

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04:54 1 that when large spills occur, primarily we rely in the U.S.  
04:54 2 on-water containment and recovery, which is skimming.

04:54 3 The second passage states that between 1999 and 2004,  
04:54 4 dispersants were used in a number of incidents in the Gulf of  
04:54 5 Mexico. When you look at the details, it actually should say  
04:54 6 between 1998 and 2004, but regardless, it shows that  
04:54 7 preapprovals were in place by that point and that within the  
04:55 8 Gulf of Mexico area of the United States, the use of aerial  
04:55 9 dispersants was an accepted practice.

04:55 10 Q. Captain VanHaverbeke, are you familiar with the Incident  
04:55 11 Command System, or ICS?

04:55 12 A. Yes.

04:55 13 Q. When was the ICS developed as an oil spill response team?

04:55 14 A. The *Exxon Valdez* really showed that we -- we generally, in  
04:55 15 spill response, were not prepared for major response to build  
04:55 16 up that large number of people that you might need, an  
04:55 17 organization, and manage it.

04:55 18 So through the '90s, the early part of the '90s, we  
04:55 19 were struggling to find a way to handle it. And a number of us  
04:55 20 discovered, if you will, Incident Command System, which was  
04:55 21 developed by the fire -- the Forest Service and the fire  
04:55 22 people.

04:55 23 And it showed that because it's scalable, it's  
04:56 24 modular, it was a very -- and it's very structured, it was a  
04:56 25 good way to handle what might be almost an overnight buildup of

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04:56 1 hundreds of people in an organization.

04:56 2 It became so evident that it was the way to go as it  
04:56 3 was used more and more, the Coast Guard headquarters mandated  
04:56 4 its use for pollution response in the late '90s, and a few  
04:56 5 years later actually mandated its use for the entire Coast  
04:56 6 Guard operational spectrum.

04:56 7 Q. We just talked about ICS, ERMA burning and dispersants.  
04:56 8 Were all of these tools used during the *Deepwater Horizon*  
04:56 9 response?

04:56 10 A. Yes.

04:56 11 Q. Were they used in any way that's different than the way  
04:56 12 they are in a typical response?

04:56 13 A. For the *Deepwater Horizon*, the big -- the big difference  
04:56 14 was, obviously, the scale of it. We -- we had never set up an  
04:57 15 ICS that large. ERMA was new, we used it for SONs, but -- but  
04:57 16 that was it.

04:57 17 But the other mechanisms, skimming, burning,  
04:57 18 dispersing, they were off the shelf, but the scale of this --  
04:57 19 this discharge and the long -- the long lead -- the long time  
04:57 20 during which it occurred were not -- were not normal.

04:57 21 Q. And --

04:57 22 A. They weren't something we had experienced in this country  
04:57 23 before.

04:57 24 Q. During the *Deepwater Horizon* response, what were the  
04:57 25 primary tools used to address oil in the environment?

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04:57 1 A. The bulk of the oil that was addressed was done through  
04:57 2 skimming, burning, and dispersing.

04:57 3 Q. And were these response tools new or existing  
04:57 4 technologies?

04:57 5 A. They were existing technologies for the most part. And I  
04:57 6 say for the most part because we did come up with a new wrinkle  
04:57 7 with dispersants. Some work done by the Minerals Management  
04:58 8 Service in a report that they had from 1999 talked about subsea  
04:58 9 dispersants, the subsea application dispersants, and ExxonMobil  
04:58 10 contacted BP and said, there's this idea that's been out there,  
04:58 11 ExxonMobil had done some research on their own about it, and  
04:58 12 they offered that research for the response.

04:58 13 BP took -- took that idea to the Unified Command --  
04:58 14 Unified Area Command. And after some significant discussion  
04:58 15 with the Unified Area Command in Washington, D.C., a series of  
04:58 16 tests were put in, and eventually this new system or this new  
04:58 17 way of applying dispersants was adopted for the response.

04:58 18 Q. We discussed the use of some existing tools during  
04:58 19 response. Did the response organization also include a  
04:58 20 structure for developing or evaluating new response tools?

04:59 21 A. Yes. The Alternative Response Technology, or ART.

04:59 22 Q. Was there any other structure within the response for the  
04:59 23 same purpose?

04:59 24 A. There was some concern early on in -- well, early on --  
04:59 25 during May, there was concern that -- BP was getting ideas, but



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04:59 1 the public thought that they were sitting on them. Part of the  
04:59 2 issue we had was public awareness of what was really going on.

04:59 3 So to address that, the National Incident Commander  
04:59 4 ordered the federal government to set up a parallel  
04:59 5 organization, which was IATAP, the Interagency Technology  
04:59 6 Assessment Program.

04:59 7 Q. And did you work on -- you worked in both these  
04:59 8 organizations during the response; right?

04:59 9 A. Yes. Depending on whether I was in Houma or up in New  
04:59 10 London, where the Coast Guard R&D center is.

04:59 11 Q. What was the purpose of ART?

04:59 12 A. ART kind of had two purposes, from my perspective. One  
05:00 13 was to try to glean from the public and the industry and  
05:00 14 everybody else new ideas and evaluate them and see if we could  
05:00 15 improve the response.

05:00 16 The second part of the role that I played in Houma  
05:00 17 was to attend planning and operational meetings to hear what  
05:00 18 the problems were they were having during the response, the  
05:00 19 actual people who had boots on the ground, to see if we could  
05:00 20 then go back to ART, and then I would relay those issues back  
05:00 21 to the ART people and see if they could find solutions.

05:00 22 Q. Was this a BP-led effort?

05:00 23 A. It was a Unified Command effort, but BP managed it out of  
05:00 24 Houston.

05:00 25 Q. Was the process of accepting suggestions from the public

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05:00 1 something that was unique to the *Deepwater Horizon* response?

05:00 2 A. No. It's something that we've dealt with in most  
05:00 3 significant spills. To the -- to the extent that RRTs II and  
05:00 4 III put together a process called ARTES, which is the  
05:01 5 Alternative Response Technology Evaluation System, but that  
05:01 6 system basically is a paper method of evaluating new ideas and  
05:01 7 providing the FOSC with suggestions on whether or not they  
05:01 8 would be implemented.

05:01 9 But I spoke to one of the guys that developed it, and  
05:01 10 they were thinking maybe a half dozen ideas during the  
05:01 11 response.

05:01 12 If you go back to the *Exxon Valdez*, we received quite  
05:01 13 a few ideas. I was in the Coast Guard headquarters at the  
05:01 14 time, but back then, people had to mail them in, what we now  
05:01 15 call snail mail. We had to type the response and mail it back.

05:01 16 What happened from *Exxon Valdez* to the *Deepwater*  
05:01 17 *Horizon* was the Internet developed, and it gave us the  
05:01 18 capability to post a web page where people could submit their  
05:01 19 ideas and the -- the way to put together a virtual team to  
05:02 20 evaluate those ideas and handle much -- much larger quantities.

05:02 21 **MR. ROBERS:** Please bring up D-33760.

05:02 22 **BY MR. ROBERS:**

05:02 23 Q. We're looking at a slide containing call-outs from  
05:02 24 TREN-2329867.6 and TREN-232987.9, a document entitled  
05:02 25 "Alternative Response Technology Program Final Report" dated

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05:02 1 September 2010. Did you rely on this document in forming your  
05:02 2 opinions?

05:02 3 A. Yes.

05:02 4 Q. What is this document?

05:02 5 A. This was a final report put together on the ART effort  
05:02 6 published in October, I think -- maybe it says September  
05:02 7 2010 -- basically summarizing what we did and what the lessons  
05:02 8 learned were.

05:02 9 Q. And how does the information in this report inform your  
05:02 10 opinion?

05:02 11 A. Well, it -- it provides some of the statistics. It gives  
05:02 12 a sense of the scale we were dealing with. 123,000 ideas, of  
05:03 13 which 80,000 address source control. And I wasn't part of  
05:03 14 that. But 43,000 addressing how to improve our response -- oil  
05:03 15 spill cleanup capabilities.

05:03 16 After sifting through that 43,000, about 100 of them  
05:03 17 got serious attention. Out of those, about 25 got actually  
05:03 18 significant use.

05:03 19 Captain Paskewich in his paper says 40, and I've seen  
05:03 20 other lists that we've got numbers like that. But whether it  
05:03 21 was 25 or 40, either way, out of the 43,000, narrowed it down  
05:03 22 to a very few that actually got some use.

05:03 23 Q. And you mentioned Captain Paskewich. Did he present a  
05:03 24 list of technologies that he claims to have been innovations  
05:03 25 stemming from the *Deepwater Horizon* response effort?

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05:03 1 A. Yes. I don't recall which one of his reports, but  
05:03 2 basically he had a page of ideas that -- or -- or new concepts  
05:04 3 that were used for the *Deepwater Horizon*.

05:04 4 Q. And were all the technologies presented on that page or in  
05:04 5 his report newly invented during the response?

05:04 6 A. No. They were -- a number of them were ideas --  
05:04 7 capabilities, tools that were literally off the shelf. Others  
05:04 8 were ideas that were adapted from other industries.

05:04 9 Q. Please provide an example of the type of off-the-shelf  
05:04 10 technology that was either adapted or specifically designed for  
05:04 11 use in oil spill response during -- used during *Deepwater*  
05:04 12 *Horizon* response.

05:04 13 A. The best example is the -- one of the first ones he lists  
05:04 14 is a laser fluorosensor, which was developed with Coast Guard  
05:04 15 Research and Development funding as part of our effort to  
05:04 16 address sunken oil.

05:04 17 **MR. ROBERS:** Please call up D-33763.

05:05 18 **BY MR. ROBERS:**

05:05 19 Q. We're looking at a slide containing TREX-230448, a  
05:05 20 document entitled "Alternative Response Technologies:  
05:05 21 Progressing Learnings" authored by Michael Ortiz (verbatim) and  
05:05 22 Hunter Rowe dated February 15th, 2012.

05:05 23 Did you rely on this document in forming your  
05:05 24 opinions?

05:05 25 A. Yes.

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05:05 1 Q. And what is this document?

05:05 2 A. It's a presentation by Mike Cortez and Hunter Rowe. I  
05:05 3 think it was at the big oil spill conference in Europe.

05:05 4 Q. And -- and who are Messrs. Cortez and Rowe?

05:05 5 A. Mike Cortez was the manager for the ART effort in Houston,  
05:05 6 and Hunter Rowe was his deputy.

05:05 7 Q. And who do they work for?

05:05 8 A. BP.

05:05 9 Q. How does the information in this report inform your  
10 opinions?

05:05 11 A. Well, again, they listed a number of technologies that  
05:06 12 were brought to bear for the *Deepwater Horizon*, and again,  
05:06 13 similar to Captain Paskewich, a lot of them were already on the  
14 shelf.

05:06 15 Q. Is there a specific passage you find particularly  
16 relevant?

05:06 17 A. Yes.

05:06 18 **MR. ROBERS:** Please bring up D-33758, a slide  
19 containing call-outs from TREN-230448.14.

05:06 20 **BY MR. ROBERS:**

05:06 21 Q. What are we looking at here, Captain VanHaverbeke?

05:06 22 A. These are basically some of the devices that they listed  
05:06 23 in here. Again, the first one, the laser fluorosensor, the  
05:06 24 Coast Guard R&D center had developed before this as part of our  
05:06 25 submerged oil effort.

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05:06 1 The Coda Octopus is a sonar with a processor that  
05:06 2 gives you what looks like a 3-D image of what the sonar is  
05:06 3 picking up. We had also -- we had tested that as part of our  
05:07 4 submerged oil and had one on hand at the R&D center and brought  
05:07 5 it to use I think off of Mobile, where we combined it with the  
05:07 6 laser fluorosensor.

05:07 7 And then the Wave Glider is a concept that was  
05:07 8 developed in the mid-2000s. The funding came from the Office  
05:07 9 of Naval Research, but it's essentially -- it looks like a  
05:07 10 surfboard with an umbilical cord that goes down to what looks  
05:07 11 like a venetian blind, and as waves move the surfboard up and  
05:07 12 down, it pulls up the blinds, and the water going through the  
05:07 13 blinds gives it thrust.

05:07 14 So this thing can go out and it -- because it's  
05:07 15 self-powered, it can stay out for long periods of time.  
05:07 16 They've sent them across the ocean.

05:07 17 But it's also got on it a solar panel to power its  
05:07 18 electronics, and a satellite comms link back to shore to  
05:07 19 wherever the pilot is. So it's -- what I liken them to is a  
05:07 20 pickup truck; it's -- it can do whatever you want.

05:08 21 So they put the sensors on it that they needed. In  
05:08 22 this case, I think they added an oxygen monitor because there  
05:08 23 was a big concern about the O2 level, a fluorosensor to see if  
05:08 24 it found any oil. And I'm not -- I don't recall what the other  
05:08 25 sensors were. But it's a technology that was adapted, but it

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05:08 1 was developed prior to the *Deepwater Horizon*.

05:08 2 Q. Does this same document provide information concerning the  
05:08 3 source of other technologies that came through the ART program  
05:08 4 or were included in Captain Paskewich's report?

05:08 5 A. Yes. It lists quite a few of them. And as with these, it  
05:08 6 gives the source of the technology.

05:08 7 Q. In any case, is the source of the technology BP?

05:08 8 A. No.

05:08 9 MR. ROBERS: You can take down the slide.

05:08 10 BY MR. ROBERS:

05:08 11 Q. Do you expect that the use of the 25 or 40 or so  
05:08 12 technologies deployed during the *Deepwater Horizon* response  
05:08 13 that we've been discussing will have a positive impact on the  
05:08 14 future of oil spill response work?

05:09 15 A. That's tough to say. Every -- every spill is different.  
05:09 16 And whether the tools used in one will work or be applicable to  
05:09 17 the next is hard to say.

05:09 18 You have to remember that this spill was of such a  
05:09 19 scale and a long period that we could do things for this one,  
05:09 20 or we did do things for this one, that you wouldn't see for a  
05:09 21 normal spill.

05:09 22 For example, we were very concerned about wave after  
05:09 23 wave of oil coming -- coming ashore on the beaches in the Gulf.  
05:09 24 And in early May, we started looking around for what options we  
05:09 25 might have for, say -- because the way you take care of a sand

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05:09 1 beach a lot of times is you go in and you just scoop up the  
05:09 2 sand and take it away, the oily sand, and -- and replace it.

05:09 3 But that was going to be counterproductive if we had  
05:09 4 to do it time after time as waves of oil came ashore. So  
05:10 5 looking around for what the options were, somebody suggested we  
05:10 6 look at the oil sands that they have up in Canada and the way  
05:10 7 that they remove the oil from the sand where up there they're  
05:10 8 trying to get the product, here we're trying to get the sand.  
05:10 9 So it's essentially the same technology.

05:10 10 So we did, and we ended up bringing in a device by a  
05:10 11 company called M-I SWACO, which was a -- we had a huge  
05:10 12 footprint, but what it allowed us to do, we set one up on  
05:10 13 Grand Isle. We could skim the oil -- skim the sandy oil, put  
05:10 14 it in the device, get out relatively clean sand and put it back  
05:10 15 in so it still had the same consistency as the original beach,  
05:10 16 and do that time after time in order to conserve it until after  
05:10 17 the final oil has come ashore, then you can do the final  
05:10 18 cleaning.

05:10 19 But it made a much more efficient process, but I  
05:10 20 don't -- I don't know of any spill where we -- any other spill  
05:11 21 in the U.S. where we would have had the justification of doing  
05:11 22 that. We don't normally have waves of oil coming ashore and we  
05:11 23 don't have that kind of duration.

05:11 24 Q. So is this likely to be something that's used in a typical  
05:11 25 future response?



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05:11 1 A. If we have another spill of this magnitude or this kind of  
05:11 2 duration, I would think that we would consider it again.

05:11 3 Q. Ultimately, how would you rate the impact of the ART  
05:11 4 program on the overall response?

05:11 5 A. I think if you look at overall the amount of oil we took  
05:11 6 out of the environment or otherwise treated, it comes back to  
05:11 7 the burning, skimming, and dispersing. And ART had very little  
05:11 8 impact on those.

05:11 9 Q. We're now going to turn to response performance. Did you  
05:11 10 prepare a slide that summarizes the opinions you'll be  
05:11 11 testifying about today related to response performance?

05:11 12 A. Yes.

05:11 13 **MR. ROBERS:** Please bring up D-33754.

05:12 14 **BY MR. ROBERS:**

05:12 15 Q. Is this the slide that you just referred to?

05:12 16 A. Yes.

05:12 17 Q. And you'll be discussing three opinions; right?

05:12 18 A. Yes.

05:12 19 Q. What are they?

05:12 20 A. Unified Command worked well, but much of the credit goes  
05:12 21 to the many stakeholders. Adding dispersants and burning are  
05:12 22 not the same as removing oil from the environment, and that  
05:12 23 only 5 percent was mechanically removed in open-water skimming,  
05:12 24 which falls short of the typical 10 to 15 percent that we  
05:12 25 expect to see.

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05:12 1 Q. Were the Coast Guard and BP the only stakeholders that  
05:12 2 participated in this response?

05:12 3 A. No. This was a very large response. I've seen a number  
05:12 4 of -- maybe a thousand different agencies and organizations  
05:12 5 that were involved.

05:12 6 Q. Can you give some examples?

05:12 7 A. Well, in addition to BP and the Coast Guard, NOAA, Fish  
05:12 8 and Wildlife Service, and the EPA had a big role. And we had  
05:12 9 the states involved as well.

05:12 10 A good example of somebody from the outside that I  
05:13 11 have not seen at a response before is the National Weather  
05:13 12 Service. They offered and they came to Houma and set up a cell  
05:13 13 there. And they -- you know, it was -- because we had our own  
05:13 14 weather service right there in Houma, they were able to provide  
05:13 15 much better support for air operations, whether it be the  
05:13 16 burning of oil or air dispersants. And they supported the  
05:13 17 people on the beach.

05:13 18 The problem -- the big concern with a lot of beach  
05:13 19 cleaning or the open -- the nearshore cleaning was the  
05:13 20 thunderstorms that might pop up in the afternoon. And because  
05:13 21 we had our own weather service there who was giving us realtime  
05:13 22 service, the people that were working onshore or nearshore knew  
05:13 23 that somebody was watching the weather. They could stay there  
05:13 24 longer and still get off in time because somebody said now is  
05:13 25 the time to clear out, which made the response more efficient.

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05:14 1 Q. All right. I think you've talked about the state and  
05:14 2 federal governments. Were local governments also stakeholders  
05:14 3 in the response?

05:14 4 A. Yes. I mean, the stakeholders varied; everybody from the  
05:14 5 federals all the way down to the state, locals, academia.  
05:14 6 There were some tribal constituencies involved as well.

05:14 7 Q. How did the participation of these various stakeholders  
05:14 8 impact the response?

05:14 9 A. Well, basically it makes it better overall. For example,  
05:14 10 the example I just gave of the National Weather Service  
05:14 11 provides a capability that you don't have elsewhere.

05:14 12 But my experience is that when you -- because you're  
05:14 13 using a Unified Command approach, because you've got a large  
05:14 14 response with a lot of different stakeholders, you're better  
05:14 15 able to understand what the issues are. At the same time,  
05:14 16 you're bringing a broader array of capabilities to bear on the  
05:14 17 response.

05:14 18 Q. Sir, did you review Captain Paskewich's report submitted  
05:15 19 in this litigation?

05:15 20 A. Yes.

05:15 21 Q. Did he offer a typical oil recovery rate for open ocean  
05:15 22 spills?

05:15 23 A. Yes. 10 or 15 percent.

05:15 24 Q. Do you agree were that?

05:15 25 A. It's -- yes. It's kind of the number that's generally

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05:15 1 accepted in the industry.

05:15 2 Q. And what's included in that 10 to 15 percent typical  
05:15 3 recovery rate?

05:15 4 A. Skimming, mechanical recovery.

05:15 5 Q. And did Captain Paskewich offer a recovery rate for the  
05:15 6 *Deepwater Horizon* response?

05:15 7 A. Yes.

05:15 8 Q. Do you agree with it?

05:15 9 A. No.

05:15 10 Q. Why not?

05:15 11 A. When Captain Paskewich estimated the -- how much was  
05:15 12 recovered, he included oil that was dispersed or burnt.

05:15 13 Q. Why shouldn't he have included oil that was dispersed or  
05:15 14 burned in his recovery rate?

05:15 15 A. Because burning oil and dispersing oil don't remove them  
05:15 16 from the environment; they just change the condition of the  
05:15 17 oil.

05:15 18 Q. Is this something that's widely understood in the response  
05:16 19 community?

05:16 20 A. Yes. And it's covered in the literature.

05:16 21 **MR. ROBERS:** Please bring up D-33776.

05:16 22 **BY MR. ROBERS:**

05:16 23 Q. We're looking at a slide that contains TREX-230012. This  
05:16 24 is a document that we looked at a little bit earlier titled  
05:16 25 "Oil Spill Dispersants, Efficacy and Effects," from the

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05:16 1 National Research Council.

05:16 2 How does the information in this report inform your  
05:16 3 opinions concerning the removal of oil from the environment?

05:16 4 A. It has a couple of passages that mention the fate of the  
05:16 5 oil.

05:16 6 **MR. ROBERS:** Please bring up D-33759, a slide  
05:16 7 containing TRES-230012.20 and TRES-230012.28, two call-outs  
05:16 8 from the same document.

05:16 9 **BY MR. ROBERS:**

05:16 10 Q. What is the significance of these passages?

05:16 11 A. Well, the first one, the first sentence says, "Oil spill  
05:16 12 dispersants do not actually reduce the total amount of oil  
05:16 13 entering the environment," which is my position.

05:17 14 And the second one: "The use of chemical dispersants  
05:17 15 as well as in-situ burning revolves around changing the fate of  
05:17 16 spilled material within the environment, as opposed to  
05:17 17 attempting recovery or removal of that material."

05:17 18 Q. Is there other support in the response literature for this  
05:17 19 same idea?

05:17 20 A. Yes.

05:17 21 **MR. ROBERS:** Please bring up D-33779, a slide  
05:17 22 containing TRES-230990.

05:17 23 **BY MR. ROBERS:**

05:17 24 Q. Another document we looked at a little bit earlier called  
05:17 25 "United States Coast Guard Oil Spill Response Offshore, In-Situ

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05:17 1 Operations Manual."

05:17 2 How does this manual inform your opinion concerning  
05:17 3 the removal of oil from the environment?

05:17 4 A. Again, it has sections where it discusses -- it provides  
05:17 5 the FOSC some background as to what -- what happens with the  
05:17 6 oil when it burns.

05:17 7 **MR. ROBERS:** Please bring up D-33764, a slide  
05:17 8 containing call-outs from TREN-230990.96 and 230990.144.

05:18 9 **BY MR. ROBERS:**

05:18 10 Q. What is the significance of these passages?

05:18 11 A. The first one discusses what happens when you're burning,  
05:18 12 and that's that the lighter ends, the oil will burn, but it  
05:18 13 leaves behind a viscous oil residue that is still a threat and  
05:18 14 remains in the environment unless you skim it. And I don't  
05:18 15 think we were able to skim it in this case.

05:18 16 And the second one talks about the fact that it emits  
05:18 17 a very dark plume, a black plume; and the remainder of the  
05:18 18 plume are particulates that go in the air, which is a concern  
05:18 19 when you're burning. You've got to make sure that you're not  
05:18 20 threatening any inhabited areas.

05:18 21 Q. How does all of this information inform your opinion  
05:18 22 concerning the calculation of recovery rate in the  
05:18 23 *Deepwater Horizon* response?

05:18 24 A. Well, basically, it supports my position that when you're  
05:18 25 trying to figure out how much is recovered, you just evaluate

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05:19 1 what's actually been picked up, what's been skimmed or  
05:19 2 mechanically removed.

05:19 3 Q. And how would you perform that calculation?

05:19 4 A. Take the total amount of oil that's been physically  
05:19 5 recovered and divide it by the total amount of oil that was  
05:19 6 discharged.

05:19 7 Q. And then what would you compare that to?

05:19 8 A. I'd compare it to the typical rate of 10 to 15 percent  
05:19 9 that Captain Paskewich cited.

05:19 10 Q. And did you -- did you do this?

05:19 11 A. Yes.

05:19 12 Q. And did you prepare a slide illustrating your findings?

05:19 13 A. I did, yes.

05:19 14 MR. ROBERS: Please bring up D-33768.

05:19 15 BY MR. ROBERS:

05:19 16 Q. Is this the slide?

05:19 17 A. Yes.

05:19 18 Q. And can you please tell us what you found?

05:19 19 A. Well, when I did the arithmetic, basically it showed that  
05:19 20 5 percent was recovered based on the amount of oil discharged  
05:19 21 that we were given last week. When I looked at that 5 percent  
05:19 22 compared to the 10 to 15 percent normally recovered in an open  
05:20 23 ocean spill, it's an unremarkable portion. And particularly  
05:20 24 when I look at the total volume, it shows that 95 percent of  
05:20 25 the oil remained in the environment.

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05:20 1 MR. ROBERS: Thank you, Captain. I have no further  
05:20 2 questions.

05:21 3 MR. BROCK: Your Honor, may I proceed?

05:21 4 THE COURT: Yes. Go ahead.

## 5 CROSS-EXAMINATION

05:21 6 BY MR. BROCK:

05:21 7 Q. Captain VanHaverbeke, I am Mike Brock. I represent BXP  
05:21 8 and I have you on cross-examination. Good afternoon.

05:21 9 A. Good afternoon.

05:21 10 Q. Let me ask you first, you agree, do you not, as the expert  
05:21 11 for the United States on source control, that BP met its  
05:21 12 obligations to respond to the *Deepwater Horizon* oil spill under  
05:21 13 the National Contingency Plan, the Oil Pollution Act, and the  
05:21 14 Clean Water Act?

05:21 15 A. You started by saying the expert on source control. I'm  
05:22 16 not an expert on source control.

05:22 17 Q. Let me rephrase the question.

05:22 18 You agree that BP met its obligations to respond to  
05:22 19 the *Deepwater Horizon* oil spill under the National Contingency  
05:22 20 Plan, the Oil Pollution Act, and the Clean Water Act?

05:22 21 A. Yes.

05:22 22 Q. BP met those obligations by participating in the  
05:22 23 Unified Command and working collectively with others in the  
05:22 24 Unified Command to meet the objectives of the response  
05:22 25 organization; correct?



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05:22 1 A. Correct. As required by regulation.

05:22 2 Q. And BP worked together with other members of the  
05:22 3 Unified Command under the direction of the FOSC in conducting  
05:22 4 response activities; correct?

05:22 5 A. Yes.

05:22 6 Q. You would agree that collaboration and unity of effort are  
05:22 7 core tenets of the Unified Command construct?

05:22 8 A. Yes.

05:22 9 Q. The Unified Command system recognizes that a unified  
05:22 10 effort between organizations responding to an incident produces  
05:23 11 the best and most efficient response; true?

05:23 12 A. Yes.

05:23 13 Q. Do you agree that in this particular matter, the  
05:23 14 *Deepwater Horizon* response, that it involved a community effort  
05:23 15 by the Coast Guard, BP, and other members of the  
05:23 16 Unified Command?

05:23 17 A. Yes.

05:23 18 Q. It's also true, is it not, that the *Deepwater Horizon*  
05:23 19 response involved a unity of effort of the Coast Guard, BP, and  
05:23 20 other members?

05:23 21 A. Yes.

05:23 22 Q. And it's correct, sir, that official government reports  
05:23 23 documenting the response have also found that same thing to --  
05:23 24 same issue to be true?

05:23 25 A. Yes.

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05:23 1 MR. BROCK: May I have TREN-92 -- 9124.4, please.

05:23 2 BY MR. BROCK:

05:23 3 Q. Do you see, sir, that this is the cover page to the  
05:23 4 Incident Specific Preparedness Review?

05:24 5 A. Yes.

05:24 6 Q. And this is the final report dated January 11, 2011?

05:24 7 A. Yes.

05:24 8 Q. This is an official report that was commissioned by the  
05:24 9 United States Coast Guard; correct?

05:24 10 A. Yes.

05:24 11 Q. In fact, following major spills, the Coast Guard can call  
05:24 12 for an independent review, or ISPR, to assess a response and  
05:24 13 provide recommendations for improvement?

05:24 14 A. Yes. But the ISPR usually has -- the charter directs them  
05:24 15 what exactly to look for. It's not a broad look; it's  
05:24 16 whatever's specifically they've been charged with evaluating.

05:24 17 MR. BROCK: Let's look at TREN-9124.1.5.

05:24 18 BY MR. BROCK:

05:24 19 Q. Do you see here that this is Admiral Papp commissioning  
05:24 20 the *Deepwater Horizon* ISPR to serve as a fact-finding body to  
05:24 21 thoroughly review the response and recovery options, evaluate  
05:24 22 planning assumptions, and identify strengths and weaknesses?

05:25 23 A. Yes.

05:25 24 MR. BROCK: 9124.24.4, please.

25

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05:25 1 **BY MR. BROCK:**

05:25 2 **Q.** Do you see here he says, "I task them to critically  
05:25 3 examine," and then down below there are a number of items that  
05:25 4 are to be reviewed?

05:25 5 Do you see that?

05:25 6 **A.** Right.

05:25 7 **Q.** And the last bullet point there, consistent with what you  
05:25 8 were telling us a few minutes ago, is that the ISPR team was to  
05:25 9 look at the actual response efforts taken, including the  
05:25 10 training, qualifications, and experience of responders.

05:25 11 Do you see that?

05:25 12 **A.** Yes.

05:25 13 **Q.** The responsible party in this case was BPXP; correct?

05:25 14 **A.** It was BP, yes.

05:25 15 **Q.** It was BPXP, wasn't it?

05:25 16 **A.** We all called them BP. The XP, to my knowledge --

05:26 17 **Q.** Did you know that the corporate --

05:26 18 **MR. ROBERS:** Objection, Your Honor. This is beyond  
05:26 19 the scope of this expert's report and his examination.

05:26 20 **THE COURT:** Well, did you differentiate between BP,  
05:26 21 BPXP --

05:26 22 **THE WITNESS:** No.

05:26 23 **THE COURT:** -- or any other BP entity?

05:26 24 **THE WITNESS:** No. When I was in Houma, it was BP, at  
05:26 25 least from my perspective.

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05:26 1 **BY MR. BROCK:**

05:26 2 **Q.** Have you ever seen the documents that relate to who was  
05:26 3 designated the responsible party?

05:26 4 **A.** No.

05:26 5 **Q.** When we look at the category there, the last word there,  
05:26 6 "responders," the responsible party would be in the list of  
05:26 7 responders; correct?

05:26 8 **A.** Yes.

05:26 9 **Q.** Now, you considered the ISPR in forming your expert  
05:26 10 opinions in this case; correct?

05:26 11 **A.** Yes.

05:26 12 **Q.** And you regard the ISPR as a reliable source of  
05:26 13 information about the response; correct?

05:26 14 **A.** Yes.

05:26 15 **MR. BROCK:** TREX-9124.13.6, please.

05:27 16 **BY MR. BROCK:**

05:27 17 **Q.** Do you see that this refers to three major areas of  
05:27 18 positive observations that merit mention?

05:27 19 Do you see that?

05:27 20 **A.** Yes.

05:27 21 **Q.** "The team observed that personnel provided by the  
05:27 22 responsible party" -- we'll call them BP for now since you're  
05:27 23 comfortable with that" -- and Coast Guard personnel worked  
05:27 24 effectively together and that there was 'unity of effort'  
05:27 25 throughout the response organization."

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05:27 1 Do you see that?

05:27 2 A. Yes.

05:27 3 Q. And do you see in the next sentence that "BP has been  
05:27 4 openly cooperative in assisting the ISPR team in the research  
05:27 5 for this report"?

05:27 6 A. Yes.

05:27 7 Q. And you agree with the ISPR report with regard to its  
05:27 8 findings with regard to the RP and Coast Guard personnel  
05:27 9 working effectively together?

05:27 10 A. I think the whole organization worked effectively, but I  
05:28 11 think you need to go back and review why it was. It didn't  
05:28 12 just happen. We had been working the Incident Command system  
05:28 13 and the Unified Command since the '90s. And not just the  
05:28 14 Coast Guard and not just BP, but the entire spill response  
05:28 15 community has been dedicated towards coming together between  
05:28 16 the PREP program, the Pollution Response Exercise Program, the  
05:28 17 Spill of National Significance exercise program. All of these  
05:28 18 efforts post-Exxon Valdez put us in a much better position to  
05:28 19 respond to this spill.

05:28 20 Q. The call-out that we're looking at here, though, refers to  
05:28 21 the RP, BP, and the Coast Guard personnel; correct?

05:28 22 A. It says "unity of effort throughout the response  
05:28 23 organization," so I would include the many contractors that  
05:28 24 BP brought, including the spill management team.

05:28 25 Q. You don't dispute the statement that's made here?

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05:28 1 A. No, I don't. I think it's fine, yes.

05:29 2 Q. Now, let's look at the second report that we have talked  
05:29 3 about a little bit in this case, and that is the on-scene  
05:29 4 coordinator report, *Deepwater Horizon* oil spill, TREX-9105.1.

05:29 5 Do you see that this is the cover page to the FOSC  
05:29 6 report?

05:29 7 A. Yes.

05:29 8 Q. This is an official report prepared by the United States  
05:29 9 Coast Guard?

05:29 10 A. Yes.

05:29 11 Q. And will you confirm, please, that the FOSC report  
05:29 12 provides the official Coast Guard record of the  
05:29 13 *Deepwater Horizon* response?

05:29 14 A. Well, I think there's a lot of other pieces to the record,  
05:29 15 but this was the FOSC's report.

05:29 16 Q. Do you agree that it is the official Coast Guard record of  
05:29 17 the response?

05:29 18 A. It's the FOSC's report on what happened.

05:29 19 Q. Let me just show you something from your deposition, and  
05:29 20 see if this helps to refresh your recollection. Page 27 at  
05:30 21 line 12.

05:30 22 Do you see the question there? "The FOSC report is  
05:30 23 the Coast Guard's official record of the *Deepwater Horizon*  
05:30 24 response documenting the situation as it developed" --

05:30 25 A. Yep.

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05:30 1 Q. -- "the actions taken, the resources committed, and the  
05:30 2 challenges encountered during the response."

05:30 3 And do you see that you said yes?

05:30 4 A. Yes.

05:30 5 Q. And was that your answer at your deposition?

05:30 6 A. Yes.

05:30 7 Q. Is that your answer today?

05:30 8 A. Yes. It's a record, I -- yes.

05:30 9 Q. Now, in preparing the FOSC report, the Coast Guard  
05:30 10 interviewed more than 200 spill response (verbatim) and other  
05:30 11 experts who were involved in the response; correct?

05:30 12 A. I don't recall the details of that. They could quite  
05:30 13 well. I don't recall that detail.

05:30 14 Q. Let me see if I can refresh your recollection. Your  
05:30 15 deposition at page 27, line 18:

05:31 16 "In preparing the FOSC report, the Coast Guard  
05:31 17 interviewed more than 200 spill response and other experts who  
05:31 18 were directly involved in the response; right?"

05:31 19 And you answered "Yes."

05:31 20 Do you see that?

05:31 21 A. Yes.

05:31 22 Q. Was that your answer at the time of your deposition?

05:31 23 A. Yes. Thank you for reminding me.

05:31 24 Q. Do you stand by that today?

05:31 25 A. Yes.

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05:31 1 Q. And you consider the FOSC report to be a reliable source  
05:31 2 of information, do you not, sir?

05:31 3 A. Yes.

05:31 4 Q. Let's look quickly at the executive summary, 9105.14.1.

05:31 5 In looking at the issue of the overall evaluation of  
05:31 6 the response, is the conclusion of the FOSC report that the  
05:31 7 *Deepwater Horizon* oil spill response was ultimately successful?

05:31 8 A. Yes.

05:31 9 Q. And that was due to the unity of effort and perseverance  
05:32 10 of the more than 1,000 organizations that contributed to the  
05:32 11 unprecedented response?

05:32 12 A. Yes.

05:32 13 Q. Did you agree with that?

05:32 14 A. Yes.

05:32 15 Q. Now, you have looked at Mr. Frank -- Captain Frank  
05:32 16 Paskewich's expert report in this case, have you not?

05:32 17 A. Yes.

05:32 18 Q. And do you recall at your deposition that we asked you  
05:32 19 about some of the documents that the Coast Guard has developed  
05:32 20 that are utilized to evaluate the success of a response effort?

05:32 21 A. Yes.

05:32 22 MR. BROCK: Can I call out, please, 230933.1.

05:32 23 BY MR. BROCK:

05:32 24 Q. Is this the August 2006 version of the Coast Guard's  
05:32 25 Incident Management Handbook?



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05:32 1 A. Yes.

05:32 2 Q. And this is one of the documents you looked at in pulling  
05:32 3 together your work in this case?

05:32 4 A. Yes.

05:32 5 Q. We also talked in the deposition about a 2014 version of  
05:33 6 this -- of this same document; correct?

05:33 7 A. Yes.

05:33 8 Q. And do you recall that the criteria for success, as set  
05:33 9 out in the 2014 version, is essentially the same as what we see  
05:33 10 in this version?

05:33 11 A. Yes.

05:33 12 MR. BROCK: If I could see, please, 230933.237.1.

05:33 13 BY MR. BROCK:

05:33 14 Q. And this just refers to the best response section of the  
05:33 15 Coast Guard manual; correct?

05:33 16 A. Yes.

05:33 17 Q. Now, if we look at TREX-13132.7.1, do you see that this is  
05:33 18 Captain Paskewich's framework for evaluating the response?

05:33 19 A. Yes.

05:33 20 Q. And are we in agreement that Captain Paskewich has  
05:33 21 selected appropriate topics and methodology for evaluating the  
05:34 22 response?

05:34 23 A. He selected the ones that he thought were appropriate,  
05:34 24 yes.

05:34 25 Q. Do you take any issue with the ones that he selected?

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05:34 1 A. I probably would have gone back to the best response and  
05:34 2 used that as a starting point, but --

05:34 3 Q. You didn't use the same -- you didn't use the best  
05:34 4 response methodology, nor did you use a methodology such as the  
05:34 5 one that Captain Paskewich will present; correct?

05:34 6 A. Right. I didn't do either.

05:34 7 Q. Now, in your Round 2 expert report, you shared in a  
05:34 8 summary way that there were many high points or notable  
05:34 9 achievements during the *Deepwater Horizon* response; correct?

05:34 10 A. Yes.

05:34 11 Q. And we asked you at your deposition what some of those  
05:34 12 might be. Do you remember that?

05:34 13 A. Yes.

05:34 14 Q. And is it correct that one of the high points of the  
05:35 15 *Deepwater Horizon* response was the overwhelming mobilization of  
05:35 16 people and resources for the response effort?

05:35 17 A. I think so.

05:35 18 Q. And another high point, as you've already mentioned, was  
05:35 19 the overall unity of effort that existed within the  
05:35 20 organization?

05:35 21 A. Yes.

05:35 22 Q. Just going back to the issue of the criteria that's set  
05:35 23 out in Captain Paskewich's report, do you agree that the  
05:35 24 considerations identified by the Coast Guard, in both the 2006  
05:35 25 and 2000 versions of Incident Management Handbook and by

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05:35 1 Captain Paskewich in his expert report, are characteristics of  
05:36 2 a successful spill response?

05:36 3 A. Yes.

05:36 4 Q. Thank you.

05:36 5 Now, we've talked a little bit about in-situ burning  
05:36 6 and dispersants. I want to ask you just a few questions about  
05:36 7 that, please.

05:36 8 It's correct, is it not, that one of the primary  
05:36 9 objectives of the response was to keep oil off of the sensitive  
05:36 10 beaches and marshes?

05:36 11 A. Yes, particularly the marshes.

05:36 12 Q. And in the response, the Unified Command, as you've said,  
05:36 13 used a variety of tools to achieve the goal of fighting the  
05:36 14 spill offshore and keeping the oil from reaching the shoreline?

05:36 15 A. Yes.

05:36 16 Q. And the tools included dispersants, in-situ burning, and  
05:36 17 skimming, among other things?

05:37 18 A. Yes.

05:37 19 Q. Do you agree, sir, that the use of in-situ burning and  
05:37 20 dispersants, as carried out by the Unified Command during the  
05:37 21 *Deepwater Horizon* response, was effective at achieving the goal  
05:37 22 of protecting the sensitive shorelines of the Gulf?

05:37 23 A. Yes.

05:37 24 Q. And do you agree that the Unified Command effectively  
05:37 25 burned and dispersed a lot of oil during the response to

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05:37 1 achieve its objective of minimizing shoreline impact?

05:37 2 A. Yes.

05:37 3 Q. You agree that the use of in-situ burning and dispersants  
05:37 4 proved to be effective tools for removing large volumes of oil  
05:37 5 from the surface of the water?

05:37 6 A. Yes.

05:37 7 Q. And you agree that the use of in situ burning and  
05:37 8 dispersants during the response proved to be effective at  
05:37 9 preventing impacts to the sensitive shorelines?

05:37 10 A. Yes.

05:37 11 MR. BROCK: Now, could we see TREN-9105.64.3, please.

05:38 12 BY MR. BROCK:

05:38 13 Q. Do you see that this is a call-out from the operations  
05:38 14 section of the FOSC report?

05:38 15 A. Yes.

05:38 16 Q. And if I can draw your attention to the highlighted  
05:38 17 portion, do you see that it says, "However, dispersants were an  
05:38 18 effective response tool and prevented millions of gallons of  
05:38 19 oil from impacting the sensitive shorelines of the Gulf of  
05:38 20 Mexico states"?

05:38 21 Do you see that?

05:38 22 A. Yes.

05:38 23 MR. BROCK: Can I see 9 -- 9124.49.1, please.

05:38 24 BY MR. BROCK:

05:38 25 Q. In addition, looking at the ISPR report, the ISPR team

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05:38 1 found that dispersants were effective on surface oil to reduce  
05:38 2 shoreline impacts and provide safety for response workers on  
05:38 3 the surface fleet?

05:39 4 A. Yes.

05:39 5 Q. Let's look at in-situ burning and what the reports say  
05:39 6 there. 9124.55.2.

05:39 7 This is from the ISPR report where it states, "Use of  
05:39 8 in-situ burning proved to be an effective tool for removing  
05:39 9 large volumes of oil from the water's surface."

05:39 10 A. Yes.

05:39 11 Q. And the ISB proved to be an effective tool for removing  
05:39 12 large volumes of oil; correct?

05:39 13 A. Yes.

05:39 14 Q. Preventing impact to environmentally and economically  
05:39 15 sensitive areas?

05:39 16 A. Yes.

05:39 17 Q. 9124.56.1. "The use of in-situ burning for this incident,  
05:39 18 coupled with dispersant applications, significantly reduced the  
05:39 19 amount of oil that might otherwise have impacted nearshore  
05:40 20 habitats and environmentally sensitive areas."

05:40 21 Do you see that?

05:40 22 A. Yes.

05:40 23 Q. And do you agree with that?

05:40 24 A. Yes. But it didn't remove it.

05:40 25 Q. Pardon?

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05:40 1 A. But it didn't remove it from the environment. Let's just  
05:40 2 not sugar-coat it.

05:40 3 Q. In terms of achieving the objectives that were set by the  
05:40 4 Unified Command of keeping oil off of the sensitive shoreline,  
05:40 5 these tools that we were talking about were very effective to  
05:40 6 achieving that goal; correct?

05:40 7 A. Yes.

05:40 8 Q. Now, I want to ask you a little bit about the  
05:40 9 contributions of BP in terms of the *Deepwater Horizon* oil spill  
05:40 10 response. Okay?

05:40 11 The Coast Guard and BP each made significant  
05:41 12 contributions to the *Deepwater* spill response; correct?

05:41 13 A. Yes.

05:41 14 Q. You agree that the contributions of the personnel from the  
05:41 15 Coast Guard and BP were important to achieving the success of  
05:41 16 the response?

05:41 17 A. Yes.

05:41 18 Q. This would not have been successful without the Coast  
05:41 19 Guard; correct?

05:41 20 A. Right.

05:41 21 Q. And it would not have been successful without BP; correct?

05:41 22 A. Right. And it wouldn't have been successful if we hadn't  
05:41 23 been planning and exercising for this for the past almost  
05:41 24 20 years.

05:41 25 Q. And part of the reason that -- also, another reason that

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05:41 1 it was successful was that BP immediately put into action its  
05:41 2 oil spill response plan and started mobilizing resources,  
05:41 3 planning for the worst, as soon as the event occurred?

05:41 4 A. Right.

05:41 5 Q. You agree that the contributions of the personnel from BP  
05:41 6 were important to achieving the success of the response?

05:42 7 A. Yes.

05:42 8 Q. Let's look at a couple of specific things that BP did.  
05:42 9 TREG-9105.131.5. This is from the logistics section of the  
05:42 10 FOSC report.

05:42 11 Q. "During the *Deepwater Horizon* response, most logistics  
05:42 12 requirements for response operations were provided by  
05:42 13 Responsible Party, (RP) BP, which had the necessary resources  
05:42 14 to identify, obtain, and deploy private sector response  
05:42 15 capabilities."

05:42 16 Do you see that?

05:42 17 A. Yes.

05:42 18 Q. And it is true, is it not, that BP was responsible for  
05:42 19 setting up the area-- the response centers and the Incident  
05:42 20 Command centers, providing the logistics for those, including  
05:43 21 much of the technology that went in, the communications, all  
05:43 22 those types of things; correct?

05:43 23 A. Yes.

05:43 24 Q. Now, if we can see 9105.131.6, again, we are in the  
05:43 25 official report of the Coast Guard, the FOSC report. We see

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05:43 1 the response was a combined effort between the government and  
05:43 2 the RP. "The RP made large-scale and significant  
05:43 3 contributions" -- did I just read that? I think I did.

05:43 4 No, I didn't.

05:43 5 "The RP made large-scale and significant  
05:43 6 contributions to logistics, procuring much-needed resources,  
05:43 7 such as boom, skimmers, and decontamination equipment, and  
05:43 8 providing food, housing, and transportation for the more than  
05:43 9 47,000 response personnel. The RP also managed the logistics  
05:44 10 and finance of the Vessels of Opportunity (VoO) program."

05:44 11 Do you see that?

05:44 12 A. Yes.

05:44 13 Q. And those were significant contributions to the response  
05:44 14 effort?

05:44 15 A. Yes.

05:44 16 Q. Now, I understand that the federal government, the states,  
05:44 17 and many other organizations participated in the response; but  
05:44 18 it's correct, isn't it, that BP provided most of the personnel  
05:44 19 who worked on the response?

05:44 20 A. Right, either directly or through contractors.

05:44 21 Q. Let me just -- to make a point of this, please look at,  
05:44 22 consistent with what you've said, TREN-247590.1.2.

05:44 23 Do you see that this is a *Deepwater Horizon* manpower  
05:44 24 summary?

05:44 25 A. Yes.



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05:44 1 Q. And do you see that there is -- I've got a call-out there  
05:45 2 that gives a total number of persons who are working in the  
05:45 3 response on a particular day, May the 15th, 2010?

05:45 4 A. Yes.

05:45 5 Q. And do you see that that number is about 15,000 people?

05:45 6 A. Yes.

05:45 7 Q. If you come over, you see an R and you see that's a little  
05:45 8 over a thousand people. Do you see that?

05:45 9 A. Yes.

05:45 10 Q. That's a thousand people working on behalf of the  
05:45 11 responsible party from within their organization; correct?

05:45 12 A. It appears, yes.

05:45 13 Q. All right. And then can you see the BP contractor number  
05:45 14 there is 15,000 -- I mean -- what is it ...

05:45 15 A. Yeah.

05:45 16 Q. Is it -- is it 17,000?

05:45 17 A. No. It's 15,233.

05:45 18 Q. Yeah, 15,233. I couldn't see it. Thank you.

05:45 19 So just confirming what you said a minute ago, that  
05:46 20 the great majority of the people who were working in the  
05:46 21 response were either BP employees or folks that BP had  
05:46 22 contracted with to do various tasks within the response?

05:46 23 A. Yes.

05:46 24 Q. We'll turn our attention now, please, to some work that BP  
05:46 25 did that you've talked about a little bit in your deposition.

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05:46 1 I want to ask you first about the monies that were committed by  
05:46 2 BP for early restoration.

05:46 3 You're familiar with that?

05:46 4 A. A little bit, yes. I'm not -- it's not my expertise, but  
05:46 5 I have some familiarity with it.

05:46 6 Q. You're aware that BP voluntarily committed \$1 billion to  
05:46 7 fund early restoration projects related to the *Deepwater*  
05:46 8 *Horizon* incident?

05:46 9 A. That was my understanding, yes.

05:46 10 Q. BP, to your understanding, also voluntarily committed  
05:47 11 \$500 million to support the Gulf of Mexico Research Initiative?

05:47 12 A. Right. I think over ten years or something like that.

05:47 13 Q. Correct.

05:47 14 Provided block grants to the states to advance money  
05:47 15 for response costs?

05:47 16 A. I'm aware of it, but don't have the details.

05:47 17 Q. You are aware that they advanced money to the states to  
05:47 18 promote tourism?

05:47 19 A. Yes.

05:47 20 Q. Do you have the details on that?

05:47 21 A. No.

05:47 22 Q. Proactively took steps to respond to economic impacts of  
05:47 23 the spill?

05:47 24 A. Yes.

05:47 25 Q. You are aware that BP paid claims directly and without

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05:47 1 requiring that the claims go through the Oil Spill Liability  
05:47 2 Trust Fund in the early weeks after the spill; correct?

05:47 3 A. Yes.

05:47 4 Q. And you're aware that it was not a requirement that BP pay  
05:47 5 those claims directly?

05:48 6 A. I was aware of it, yes.

05:48 7 Q. But the way in which they did it allowed the funds to be  
05:48 8 processed on a speedier time scale?

05:48 9 A. Yes.

05:48 10 **MR. ROBERS:** Objection. I think most of this is  
05:48 11 beyond the scope of this expert's report.

05:48 12 **MR. BROCK:** Well, this -- these are points that are  
05:48 13 within the -- the scope of oil spill response and points made  
05:48 14 in the deposition, Your Honor. It's cross-examination.

05:48 15 **THE COURT:** I don't remember him testifying in -- in  
05:48 16 that area on direct.

05:48 17 **MR. BROCK:** All right. I'll go to the ART program,  
05:48 18 Your Honor.

05:48 19 **BY MR. BROCK:**

05:48 20 Q. You testified a little bit about the ART program; correct,  
05:48 21 sir?

05:48 22 A. Yes.

05:48 23 Q. And you agree that during the *Deepwater Horizon's*  
05:48 24 response, the Unified Command, including the Coast Guard and  
05:48 25 BP, adapted proven spill response technologies and employed new

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05:48 1 or innovative technologies to fight the spill; correct?

05:48 2 A. Yes.

05:48 3 Q. Are you familiar with the innovations that took place with  
05:49 4 regard to in-situ burning?

05:49 5 A. My review showed that the innovations were marginal.

05:49 6 Basically, we had the capability on the shelf, but it was all  
05:49 7 based upon tests because we'd never -- we never had the lab we  
05:49 8 had for 90 days to burn oil. So there were some improvements  
05:49 9 made, but I think they were marginal.

05:49 10 Q. Were you involved in the daily planning for the in-situ  
05:49 11 burns that would take place during the response?

05:49 12 A. No.

05:49 13 Q. Do you know what was discussed in the morning meetings  
05:49 14 before the crews would be sent out for in-situ burning  
05:49 15 operations?

05:49 16 A. Specifically, no.

05:49 17 Q. Do you have specific knowledge of discussions that would  
05:49 18 take place on a daily basis about the way in which in-situ  
05:49 19 burning could be managed more effectively?

05:49 20 A. No.

05:50 21 Q. Are you aware of the fact that BP, after the well was shut  
05:50 22 in and for a period of years after that, went around the world  
05:50 23 speaking to leaders of government and folks that were involved  
05:50 24 in drilling to convey lessons learned from the *Deepwater*  
05:50 25 *Horizon* spill?

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05:50 1 A. Yes.

05:50 2 Q. Did you know that they did that approximately 200 times?

05:50 3 A. No.

05:50 4 Q. But you did know that they were doing that?

05:50 5 A. I knew they were doing that.

05:50 6 Q. And that's a good thing to do, isn't it?

05:50 7 A. Yes. But my -- my testimony was all supposed to be about  
05:50 8 the response, and that's post-response.

05:50 9 Q. Now, in your opinion, the development of new response  
05:50 10 techniques or technologies during the *Deepwater Horizon* spill  
05:50 11 resulted from collaboration. Those things that were developed  
05:50 12 came from collaboration?

05:51 13 A. Yes.

05:51 14 Q. And that BP and the Coast Guard worked together to explore  
05:51 15 and develop new technologies during the response?

05:51 16 A. We did, and we had -- there were a lot of other people  
05:51 17 coming up with ideas and --

05:51 18 Q. You agree --

05:51 19 A. -- we tried to look at them all.

05:51 20 Q. You agree that BP made contributions to that effort?

05:51 21 A. Yes.

05:51 22 Q. And during the response, BP and the Coast Guard were  
05:51 23 making considerable efforts to identify places where they could  
05:51 24 advance spill response capabilities; correct?

05:51 25 A. We were trying to find better ways to respond to the

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05:51 1 spill, yes.

05:51 2 Q. Now, you were part of the ART program that you talked  
05:51 3 about during the response; correct?

05:51 4 A. Yes.

05:51 5 Q. And when you -- did you say that it produced marginal  
05:51 6 results? Was that your words?

05:51 7 A. Yes.

05:51 8 Q. And when you say "marginal," what you mean is that you  
05:52 9 didn't think that the ART program significantly increased the  
05:52 10 amount of oil that was recovered?

05:52 11 A. I don't think we significantly increased the amount that  
05:52 12 was recovered, burned, or dispersed.

05:52 13 Q. Let me just be sure we're clear on this. You're not  
05:52 14 saying that the ART program was a waste of time for the Coast  
05:52 15 Guard and BP, are you?

05:52 16 A. No, certainly not. I think there was a lot of value both  
05:52 17 in terms of giving the public an outlet so that they could  
05:52 18 present their ideas. And this was, in the commandant's words,  
05:52 19 "all hands on deck." So any ideas that would help us improve  
05:52 20 our recovery, we wanted to hear about it.

05:52 21 And, you know, it wasn't that there weren't any  
05:52 22 improvements. For example, a company up in Canada sent us  
05:52 23 these -- what looked like big basketballs that they call "ice  
05:52 24 spheres," that they sent them to us. They said, "Here, use  
05:53 25 these because they're designed to track oil."

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05:53 1 And one of the ways we used them is the SMART team  
05:53 2 that was out tracking the effectiveness of dispersant didn't  
05:53 3 have a focal point for once they get out there. If you're out  
05:53 4 in the middle of ocean, it all looks the same. They had to  
05:53 5 back off 2 miles from the central area of the -- of where the  
05:53 6 dispersant was going to be put down. And trying to relocate  
05:53 7 that -- that location afterwards was difficult.

05:53 8 So they -- we gave them some of the ice spheres to  
05:53 9 use so that they -- they could go back and find them. You  
05:53 10 know, that -- that didn't impact big time, but that was a  
05:53 11 marginal improvement.

05:53 12 Q. All right. Let's turn to dispersant operations, if we  
05:53 13 could, please.

05:53 14 You agree that there were two dispersants that were  
05:53 15 utilized in the response, Corexit 9500-A and Corexit 9527-A;  
05:53 16 correct?

05:54 17 A. Yes.

05:54 18 Q. And both of those dispersants were listed on the National  
05:54 19 Contingency Plan product schedule as approved dispersant  
05:54 20 products?

05:54 21 A. They're not -- they're not approved. They're accepted, I  
05:54 22 think, is EPA's words. EPA's got a word. I don't recall  
05:54 23 exactly.

05:54 24 Q. All right. As accepted dispersant products, is that --

05:54 25 A. Yes.

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05:54 1 Q. -- a better way of saying it?

05:54 2 A. Yes.

05:54 3 Q. And both of the dispersants that we -- we are talking  
05:54 4 about are, to this day, still included on the National  
05:54 5 Contingency Plan product schedule as acceptable dispersants for  
05:54 6 use in a spill?

05:54 7 A. Yes.

05:54 8 Q. As you've mentioned, they were applied in two ways, on the  
05:54 9 surface and at the subsea; correct?

05:54 10 A. Yes.

05:54 11 Q. And there was an RRT6 preapproved plan for the use of  
05:54 12 dispersants in the Gulf of Mexico response action; correct?

05:54 13 A. In the RRT6 area, yes.

05:54 14 Q. Yes. And the FOSC approved dispersant application during  
05:55 15 the response?

05:55 16 A. Yes.

05:55 17 Q. And as part of that work, it's also true that there was  
05:55 18 established a monitoring program for dispersant use?

05:55 19 A. I'm not sure exactly. Are you talking about the SMART  
05:55 20 program or the protocol or something else?

05:55 21 Q. I am talking about -- I am talking about the SMART  
05:55 22 protocol. The Unified Command used special monitoring of  
05:55 23 applied response technologies or what they referred to as SMART  
05:55 24 monitoring protocols; correct?

05:55 25 A. Right.



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05:55 1 Q. And you agree that dispersant operations in the response  
05:55 2 were carried out safely and effectively; correct, sir?

05:55 3 A. Yes.

05:55 4 Q. And you also agree that BP provided resources that were  
05:55 5 needed to support the dispersant operations; correct, sir?

05:56 6 A. Yes.

05:56 7 Q. All right. Going back to the history of the expert  
05:56 8 reports that you have filed in this case. In your opening  
05:56 9 report, you focus primarily on technology; correct?

05:56 10 A. Yes.

05:56 11 Q. Captain Paskewich filed a report, and you put in a  
05:56 12 response to that report that addressed the issue that  
05:56 13 Captain Paskewich had referred to in terms of the effectiveness  
05:57 14 of the spill; correct?

05:57 15 A. Yes.

05:57 16 Q. And in your reply report you significantly understated the  
05:57 17 effectiveness of the combined tools of dispersants, in-situ  
05:57 18 burning, and the use of collection of oil -- or the technique  
05:57 19 of collecting the oil?

05:57 20 A. I -- I understated it did because I used the wrong  
05:57 21 denominator and corrected that in errata in December. But now  
05:57 22 we have the correct denominator, so I submitted a revised --  
05:57 23 revision based on that.

05:57 24 Q. My question is this, though, sir: When you submitted your  
05:57 25 reply report to Captain Paskewich's opening report, you

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05:57 1 understated the effectiveness of the intervention techniques in  
05:58 2 a pretty significant way, didn't you?

05:58 3 A. I don't recall the -- how significant it was, but, yes, I  
05:58 4 did understate them.

05:58 5 Q. You understated it by about 400,000 barrels, didn't you?

05:58 6 A. I used percentages; I didn't use direct numbers.

05:58 7 Q. Well, if we were to apply the percentages, it would be  
05:58 8 about 400,000 barrels?

05:58 9 A. I don't know. But it doesn't matter because the total  
05:58 10 amount discharged has been presented to us, so it's ...

05:58 11 Q. Now, after you presented your Round 2 report,  
05:58 12 Captain Paskewich filed a reply to the report that you filed;  
05:58 13 correct?

05:58 14 A. Yes. In which he pointed out that I erred.

05:58 15 Q. That you had made a mistake?

05:59 16 A. Yes.

05:59 17 Q. And then your deposition was taken after you saw  
05:59 18 Captain Paskewich's Round 3 report where he pointed out the  
05:59 19 mistake that you had made?

05:59 20 A. Yes.

05:59 21 **MR. BROCK:** Now, can we call up, please, D-35401.

05:59 22 **BY MR. BROCK:**

05:59 23 Q. Now, this, sir, is the exhibit that was included with  
05:59 24 Captain Paskewich's report that reflected his calculations;  
05:59 25 correct?

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05:59 1 A. Yes. This looks like it came from his Round 1 report.

05:59 2 Did it?

05:59 3 Q. Correct, it did.

05:59 4 And as shown in the graphic in the opening report,  
05:59 5 Captain Paskewich was relying on the United States  
06:00 6 interrogatory responses that determined that about 1.2 million  
06:00 7 barrels of oil was chemically dispersed, skimmed, and burned;  
06:00 8 correct?

06:00 9 A. Yes.

06:00 10 Q. And from there, Captain Paskewich then calculated a  
06:00 11 removal rate, based on that total, as a percent of both the  
06:00 12 government's and BP's spill volume; correct?

06:00 13 A. That's what he calculated, yes.

06:00 14 MR. BROCK: Your Honor, may I approach and get to the  
06:00 15 white board, please?

06:00 16 THE COURT: Sure. It must be late. We've resorted  
06:00 17 to pen and paper.

06:00 18 MS. HIMMELHOCH: Your Honor, if I could ask that it  
06:01 19 be angled just slightly more so counsel can see, or pushed back.

06:01 20 MR. BROCK: I don't know if you want to come stand in  
06:01 21 the well or -- I wanted Judge Barbier to be able to see it.

06:01 22 THE COURT: You can come around. Maybe stand over  
06:01 23 here. Stand over here.

06:01 24 MS. HIMMELHOCH: Thank you, Your Honor.

06:01 25 MR. BROCK: Just one second. I'm sorry.

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06:01 1 BY MR. BROCK:

06:01 2 Q. All right. So if we look over to the screen,  
06:02 3 Captain Paskewich performed two calculations, if you look at  
06:02 4 the second bar going from the right; correct, sir?

06:02 5 A. Second bar from the right?

06:02 6 Q. The one that says 29 percent and 49 percent?

06:02 7 A. Yes.

06:02 8 Q. And the way in which he made the calculation about  
06:02 9 effectiveness is that he first took the government's number as  
06:02 10 to the total spill -- first of all, he took the number that the  
06:02 11 government had furnished in terms of those amounts of oil that  
06:02 12 were removed by skimming, in-situ burning, and dispersants;  
06:02 13 correct?

06:02 14 A. Yes.

06:02 15 Q. And then he did two calculations -- I'm failing. I think  
06:03 16 these may be dry erase. Let's just do it this way.

06:03 17 He did two calculations -- he did two calculations,  
06:03 18 one where he took the government's number on flow rate.

06:03 19 This was before we had Judge Barbier's ruling;  
06:03 20 correct?

06:03 21 A. Yes.

06:03 22 Q. And when he did that calculation, he found that the  
06:03 23 removal rate was 29 percent; correct?

06:03 24 A. Yes.

06:03 25 Q. And you agreed, based on what was known at the time,

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06:04 1 assuming this 4.1 million flow rate, that this calculation was  
06:04 2 correct?

06:04 3 A. I agree that that is how much was treated -- was treated  
06:04 4 or burned. My difference is I don't consider that removal.  
06:04 5 Removal is what you pick up. That was dispersed into the  
06:04 6 environment.

06:04 7 Q. You've made that clear. I'm speaking now about keeping  
06:04 8 oil off the beaches, the goal of the response.

06:04 9 So it's 29 percent if you use the government's number  
06:04 10 of 4.1 million barrels, using the answer to interrogatories  
06:04 11 that was furnished by the United States of America on how much  
06:04 12 oil was removed using the techniques that we talked about;  
06:04 13 correct?

06:04 14 A. Was burned, dispersed, or skimmed.

06:04 15 Q. Correct.

06:04 16 And then he performs a second calculation where again  
06:04 17 he uses the same numerator, but this time the denominator is  
06:05 18 the number that BP was advancing was the flow from the well.

06:05 19 Do you remember that?

06:05 20 A. Yes.

06:05 21 Q. And I think he used a number, something around  
06:05 22 2.45 million barrels of oil. Correct?

06:05 23 A. That looks -- yes.

06:05 24 Q. Okay. And that reflected a removal rate of 49 percent;  
06:05 25 correct?

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06:05 1 A. Yes.

06:05 2 Q. And you agreed that that calculation was performed  
06:05 3 appropriately; correct?

06:05 4 A. The calculation was appropriate. But I don't, frankly --  
06:05 5 you'll have to explain what we're talking about.

06:05 6 **THE COURT:** Well, let me interject here because it's  
06:05 7 getting late. You are using your own time, Mr. Brock. So  
06:05 8 ordinarily, I wouldn't stop you or interject.

06:05 9 But I have to understand where you're going with  
06:05 10 this because the points you're making, having the witness  
06:06 11 answer you now, don't seem to be something that he disputes or  
06:06 12 has disputed.

06:06 13 I think the difference -- the focus of his  
06:06 14 testimony, as I understand it, compared to the other expert --  
06:06 15 what's -- I'm sorry, Captain Paskewich -- is the definition of  
06:06 16 "removal." You know, he just -- he believes -- this witness  
06:06 17 apparently believes that it doesn't remove the oil from the  
06:06 18 environment if you burn it or disperse it; only with skimming  
06:06 19 it. Your own expert apparently has a different opinion on  
06:06 20 that.

06:06 21 But the math is simple. We can all do the math.  
06:06 22 So it just depends what numbers you use. You're going to come  
06:06 23 up with the same -- the same result.

06:06 24 **MR. BROCK:** Yes, sir.

06:06 25 **THE COURT:** So I'm not sure where you're headed with

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06:06 1 this. But if there's another point to be made, I'm going to  
06:06 2 let you make it.

06:06 3 **MR. BROCK:** Okay. I'll just describe it, and then --  
06:07 4 and then I'll move on, because it may come up later.

06:07 5 **THE COURT:** Okay.

06:07 6 **MR. BROCK:** So we now have a number that is between  
06:07 7 2.45 and 4.1 -- which we have a reality of what the flow of oil  
06:07 8 is now from your order.

06:07 9 **THE COURT:** The percentage will be between 29 and 49.

06:07 10 **MR. BROCK:** Correct. I just wanted him to confirm  
06:07 11 for the record that he was in agreement with these calculations  
06:07 12 for that reason.

06:07 13 **THE COURT:** I think we can all agree with the math.

06:07 14 Do you want to say something?

06:07 15 **THE WITNESS:** I can't agree with that.

06:07 16 **THE COURT:** You can't agree with that?

06:07 17 **THE WITNESS:** Because I don't -- the problem we have  
06:07 18 is -- I can tell you how much was burned --

06:07 19 **THE COURT:** I know. We're not -- we're not getting  
06:07 20 into that. He's just pointing out that if you take 1.2 million  
06:07 21 and you divide it by 3.19 million, you're going to come up with  
06:07 22 a percentage between 29 and 49; right?

06:07 23 **THE WITNESS:** But this is assuming that what is  
06:07 24 dispersed --

06:08 25 **THE COURT:** No, no. We're not assuming anything.

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06:08 1 He's just confirming the math, the number.

06:08 2 **THE WITNESS:** Okay. But I don't know now how much  
06:08 3 was actually dispersed.

06:08 4 **THE COURT:** We're not asking you to agree with the  
06:08 5 effect of it.

06:08 6 **THE WITNESS:** No, it's not effect, Your Honor.

06:08 7 It's because -- because of the way the oil  
06:08 8 budget calculator works, it's based on assumed daily rate  
06:08 9 coming out of the well.

06:08 10 **THE COURT:** So you're saying if you change the larger  
06:08 11 number, the volume of oil that came out of the well, it could  
06:08 12 change the calculation of how much was dispersed?

06:08 13 **THE WITNESS:** It changes -- I don't know the  
06:08 14 calculations well enough to know what the impact is. Because  
06:08 15 what it does is it -- it says a certain percentage -- and it  
06:08 16 has allowances for the unknowns. It says a certain percentage  
06:08 17 is dispersed based on some assumed rates with variations. It  
06:08 18 says some of it gets dissolved in the water, some of it  
06:08 19 evaporates.

06:09 20 I tried doing it by simple math and came up with  
06:09 21 odd numbers. So I don't know. That's all I'm saying is I  
06:09 22 don't know.

06:09 23 **MR. BROCK:** Our point for Your Honor is I wanted him  
06:09 24 to confirm these numbers. We do think the number is between 29  
06:09 25 and 49. We're going to present some evidence on that. I just



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06:09 1 wanted him to confirm that that was his --

06:09 2 **THE COURT:** I think the problem is you're all talking  
06:09 3 past each other. Because you're talking about how much oil may  
06:09 4 have reached the beach or the shore. He's talking about how  
06:09 5 much oil was removed from the environment. So you're like two  
06:09 6 ships passing in the night. That's, I think, what we're  
06:09 7 quibbling about here.

06:09 8 **MR. BROCK:** I understand his point; I think he  
06:09 9 understands mine.

06:09 10 **THE COURT:** Okay.

06:09 11 **MR. BROCK:** But I'm just making a point on the  
06:09 12 calculation.

06:09 13 **THE COURT:** I understand. Okay. Good.

06:09 14 **MR. ROBERS:** Your Honor, it may be slightly talking  
06:09 15 past each other, but I think the distinction comes from the  
06:09 16 last question Mr. Brock asked. I don't think there's any --

06:09 17 **THE COURT:** I think I -- I understand what the  
06:09 18 witness said. He -- he's not certain about that it's that  
06:09 19 simple of a calculation; right?

06:09 20 **THE WITNESS:** Yes, sir.

06:09 21 **THE COURT:** Okay.

06:10 22 **BY MR. BROCK:**

06:10 23 **Q.** Now, one more question on this just so I have it clean for  
06:10 24 the record. At your deposition, you agreed that Captain  
06:10 25 Paskewich had accurately calculated the effectiveness of

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06:10 1 skimming, burning, and chemical dispersing operations in the  
06:10 2 *Deepwater Horizon* response, as shown in this graphic; correct?

06:10 3 A. He calculated correctly based on his methods, yes.

06:10 4 MR. BROCK: All right. Just a few more, Judge. I  
06:10 5 apologize.

06:10 6 BY MR. BROCK:

06:11 7 Q. Captain, you know Captain Paskewich outside the context of  
06:11 8 this case, do you not?

06:11 9 A. Yes.

06:11 10 Q. And you do regard him as an expert in the area of oil  
06:11 11 spill response; correct?

06:11 12 A. Yes.

06:11 13 Q. What's the largest spill that you've ever been involved in  
06:11 14 as an FOSC?

06:11 15 A. As an FOSC, I don't know, it was probably around  
06:11 16 5,000 gallons or so.

06:11 17 Q. 5,000 gallons?

06:11 18 A. Yes.

06:11 19 Q. How many barrels is that?

06:11 20 A. I would have to do the math, but it's not working in my  
06:11 21 head, no. A little over 100.

06:11 22 Q. Okay. About 100 barrels --

06:11 23 A. Well, something in excess of that, dividing by 42.

06:11 24 Q. All right. During the response, BP participated in  
06:11 25 community outreach efforts in addition to town hall and

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06:11 1 expo-type meetings; is that right?

06:11 2 A. Yes.

06:12 3 Q. And it established several community outreach centers  
06:12 4 across the Gulf during the response; correct?

06:12 5 A. Yes.

06:12 6 Q. In order to interact with people and hear their concerns?

06:12 7 A. The purpose of their outreach centers, I think, was along  
06:12 8 those lines. They also, I think, were taking claims, but I'm  
06:12 9 not sure whether that was the same thing.

06:12 10 Q. They also had a call center?

06:12 11 A. Yes.

06:12 12 Q. They had community outreach personnel and hired  
06:12 13 translators to communicate with certain folks who didn't speak  
06:12 14 English?

06:12 15 A. Yes.

06:12 16 Q. The efforts -- outreach efforts have continued in the  
06:12 17 years since 2010; correct?

06:12 18 A. I don't know. I haven't been tracking that.

06:12 19 Q. Do you recall telling us that they had -- you knew that  
06:12 20 they had continued since 2010?

06:12 21 A. I -- I may have.

06:13 22 **MR. BROCK:** One final document, please,

06:13 23 TREN-13518.8.1.

06:13 24 **BY MR. BROCK:**

06:13 25 Q. Do you see this is a community outreach, May 23rd, 2010?

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06:13 1 A. Yes. What's the source of this?

06:13 2 Q. This is one of the BP documents in terms of materials that  
06:13 3 were distributed to talk about the things they were doing.

06:13 4 Do you see it references over 100 town halls have  
06:13 5 been held, over 11,500 volunteers registered, and over  
06:13 6 5,600 volunteers trained across the Gulf Coast?

06:13 7 A. Yes.

06:13 8 Q. You have no reason to dispute that that occurred, do you?

06:13 9 A. No.

06:13 10 MR. BROCK: Captain, thank you very much for your  
06:14 11 time this afternoon.

06:14 12 THE COURT: Redirect?

06:14 13 REDIRECT EXAMINATION

06:14 14 BY MR. ROBERS:

06:14 15 Q. Brandon Robers for the United States.

06:14 16 Captain VanHaverbeke, you were asked a number of  
06:14 17 questions about the FOSC report today. Do you know when it was  
06:14 18 written?

06:14 19 A. I think it was published in 2011.

06:14 20 Q. And is the response over today?

06:14 21 A. No.

06:14 22 Q. You were also asked a series of questions about the  
06:14 23 response organization. How do you think the response went as a  
06:14 24 matter of organizational efficiency?

06:15 25 A. I think that the -- the effectiveness of the organization

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06:15 1 as a whole -- and I think this is what the FOSC report actually  
06:15 2 covers, more than the results, was the organization -- frankly,  
06:15 3 I'm amazed at how well it went, and I attribute it to all the  
06:15 4 effort that the Coast Guard and the spill response community in  
06:15 5 general, and I would think BP as the responsible -- as somebody  
06:15 6 who is in the industry, would have had to go through a bunch of  
06:15 7 the exercises. All of the work that went into being prepared  
06:15 8 for the next major spill paid off in this event.

06:15 9 I think when you look at like Admiral -- Admiral  
06:15 10 Austin stated, the certifications, all that effort that people  
06:15 11 have undergone to be ready, it really showed in this spill.

06:15 12 Q. Do you make a distinction between organizational success  
06:15 13 and response effectiveness?

06:15 14 A. Yes. I -- I'm generally of the opinion that once we've  
06:16 15 had a spill, we've lost. Basically, my -- my preference is  
06:16 16 prevention, as I think everybody's would be. The problem is  
06:16 17 once the oil spills, you're fighting gravity, physics and  
06:16 18 everything else, and trying to re-corral that oil and get it  
06:16 19 picked up or even effectively burn it or anything like that is  
06:16 20 extremely difficult.

06:16 21 So I think in this event, contrary to the *Exxon*  
06:16 22 *Valdez* response organization, all of the logistics, all of that  
06:16 23 stuff worked very well. But, again, as we saw in the end, we  
06:16 24 only recovered 5 percent of the oil, which shows that we can  
06:16 25 have a great organization, but we still can't do much better.

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06:16 1 **MR. ROBERS:** No further questions.

06:16 2 **THE COURT:** Thank you. You're done.

06:16 3 All right. We're going to recess. It's 6:15.  
06:17 4 We'll recess until 8:00 a.m. tomorrow. Next witness -- give  
06:17 5 me -- give me your order of witnesses. Let's just confirm  
06:17 6 that, Ms. Himmelhoch.

06:17 7 **MS. HIMMELHOCH:** Sorry, struggling with the  
06:17 8 microphone there. Our next witness is Dr. Mason. We also  
06:17 9 have -- the four remaining expert witnesses are -- three  
06:17 10 remaining, actually --

06:17 11 **THE COURT:** You still plan to -- you plan to call  
06:17 12 three?

06:17 13 **MS. HIMMELHOCH:** I would expect --

06:17 14 **THE COURT:** Which one are you not planning to call?

06:17 15 **MS. HIMMELHOCH:** Oh, it is four, then. I'm sorry.  
06:17 16 I'm losing track. Tomorrow morning we'll begin with a couple  
06:17 17 very short deposition videos, no more than half an hour, if  
06:17 18 even that.

06:17 19 Then it will be followed by Dr. Mason, then  
06:17 20 Mr. Walkup, then Dr. Quivik and then Mr. Ratner. Given how  
06:17 21 things have gone today, I would expect Mr. Ratner to fall over  
06:17 22 onto Friday.

06:17 23 But if we get there, we'll start him tomorrow.

06:18 24 **THE COURT:** Okay. Anybody have anything else? All  
06:18 25 right. Everyone have a good evening. We'll see everyone in

06:18 1 the morning.

06:18 2 **THE DEPUTY CLERK:** All rise.

06:18 3 (WHEREUPON, the proceedings were concluded.)

4 \*\*\*\*\*

5 **CERTIFICATE**

6 I, Jodi Simcox, RMR, FCRR, Official Court Reporter  
7 for the United States District Court, Eastern District of  
8 Louisiana, do hereby certify that the foregoing is a true and  
9 correct transcript, to the best of my ability and  
10 understanding, from the record of the proceedings in the  
11 above-entitled and numbered matter.

12  
13  
14 *s/Jodi Simcox, RMR, FCRR*  
15 Jodi Simcox, RMR, FCRR  
16 Official Court Reporter  
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| 013332.F [1] 574/7<br>013333 [1] 493/22<br>013338 [1] 493/25<br>013513 [2] 612/25 616/7<br>013514 [2] 613/4 616/7<br>013515 [2] 613/8 616/7   |   |   |
| 1   |   |   |
| 1 part [1] 497/24<br>1 percent [2] 534/23 534/24<br>1,000 [3] 520/13 523/17 649/10<br>1,000 meters [1] 523/19<br>1.0 [1] 570/25<br>1.1 [1] 591/11<br>1.2 [2] 498/4 498/13<br>1.2 micrograms [1] 574/17<br>1.2 million [2] 668/6 672/20<br>10 [8] 554/21 582/6 582/6 634/24<br>636/23 637/2 640/8 640/22<br>10 meters [1] 520/12<br>10 micrograms [2] 553/18 553/24<br>10 parts [1] 555/14<br>10 percent [1] 581/24<br>10-4536 [1] 466/7<br>10-MD-2179 [1] 466/4<br>100 [4] 628/16 675/21 675/22 677/4<br>100 parts [2] 522/20 522/20<br>100 percent [5] 527/10 548/6 548/8<br>548/11 564/9<br>1036 [1] 466/16<br>11 [1] 643/6<br>11 kilometers [1] 579/13<br>11,500 [1] 677/5<br>12 [1] 647/21<br>12237.005 [1] 596/4<br>12237.05 [1] 596/5<br>12237.1 [2] 529/2 529/3<br>12237.28.1 [1] 529/15 |   |   |
| 2   |   |   |
| 2 meters [11] 488/21 490/5 502/23<br>502/24 520/12 523/13 523/15 523/17<br>523/24 524/2 524/20<br>2 miles [1] 664/5<br>2 percent [2] 520/18 532/12<br>2,721 [1] 531/22<br>2.45 [1] 672/7<br>2.45 million barrels [1] 670/22<br>2.6 micrograms [1] 570/25<br>20 [4] 466/5 580/4 595/24 596/19<br>20 kilometers [1] 582/7<br>20 minutes [1] 573/5<br>20 percent [2] 585/14 595/23<br>20 years [1] 655/24<br>200 [4] 520/13 648/10 648/17 662/2  |   |   |



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| 2  | 40-year [1] 474/14<br>400,000 barrels [2] 667/5 667/8  | A   |
| 275 [1] 469/2<br>29 [3] 672/9 672/22 673/24<br>29 percent [3] 669/6 669/23 670/9 | 41 [2] 473/14 492/4<br>42 [1] 675/23<br>43,000 [3] 628/14 628/16 628/21<br>4400 [1] 468/24<br>4536 [1] 466/7<br>47,000 [1] 657/9<br>48 hours [2] 498/5 498/14<br>49 [3] 672/9 672/22 673/25<br>49 percent [2] 669/6 670/24   | A-E [1] 577/12<br>A-E-R [3] 577/7 577/17 577/18<br>a.m [1] 679/4<br>ABIGAIL [1] 467/7<br>ability [5] 489/10 505/11 576/14 620/10 680/9<br>able [6] 513/6 620/7 635/14 636/15 639/15 668/21<br>about [117] 477/19 480/19 481/6 485/14 485/19 485/19 487/4 489/6 498/10 498/10 500/12 501/23 503/3 507/7 508/13 509/3 516/15 518/11 518/15 519/1 521/7 521/22 527/20 529/24 529/25 532/14 534/14 536/7 540/1 540/22 542/11 543/7 545/16 545/25 551/11 551/14 554/9 556/1 556/3 556/8 558/18 559/9 559/12 559/22 561/3 563/12 566/8 566/12 566/20 570/4 573/6 573/19 583/2 583/3 583/5 583/9 583/21 584/9 587/18 589/9 590/15 590/17 591/11 595/10 595/18 596/10 598/9 602/13 607/3 607/24 611/11 620/1 624/7 625/8 625/11 628/16 628/17 631/23 632/22 634/11 636/1 639/16 645/13 647/3 649/19 650/5 652/5 652/6 655/5 655/8 658/5 658/25 659/1 660/20 661/18 662/7 663/3 663/20 665/4 665/19 665/21 665/21 667/5 667/8 668/6 669/8 670/7 670/12 671/5 674/3 674/4 674/7 674/18 675/22 677/3 677/17 677/22<br>above [10] 524/2 524/6 547/18 550/9 551/12 551/14 551/16 551/20 596/19 680/11<br>above-entitled [1] 680/11<br>absolute [1] 598/1<br>academia [1] 636/5<br>Academy [3] 602/16 622/2 622/11<br>Acadian [2] 608/20 608/20<br>acceptable [1] 665/5<br>accepted [7] 477/4 612/16 612/17 623/9 637/1 664/21 664/24<br>accepting [1] 626/25<br>access [7] 543/4 544/11 559/13 559/13 559/14 571/24 572/1<br>accommodated [3] 510/9 510/12 510/13<br>according [2] 560/9 591/20<br>account [3] 538/20 540/23 603/20<br>accurate [8] 533/6 536/23 585/21 586/25 591/16 592/5 595/17 602/10<br>accurately [6] 475/1 476/19 569/19 570/8 597/22 674/25<br>achieve [2] 652/13 653/1<br>achieved [1] 597/15<br>achievements [1] 651/9<br>achieving [6] 513/1 652/21 655/3 655/6 655/15 656/6<br>acrobic [4] 575/21 575/23 577/5 577/9<br>across [4] 519/19 631/16 676/4 677/6<br>Act [4] 641/13 641/14 641/20 641/20<br>action [5] 466/4 483/25 606/15 656/1 665/12<br>actionable [1] 599/23<br>actions [1] 648/1<br>active [2] 521/4 605/9<br>activities [1] 642/4<br>actual [9] 481/19 492/24 505/16 550/2 559/9 571/6 618/14 626/19 644/9<br>actually [41] 474/3 478/9 480/20 481/25 491/17 503/22 507/16 512/12 512/19 514/8 515/15 516/12 531/4 533/22 |
| 3  | 5  |   |
| 4  | 5<br>5 percent [4] 634/23 640/20 640/21 678/24<br>5,000 gallons [2] 675/16 675/17<br>5,337 [1] 530/19<br>5,600 volunteers [1] 677/6<br>50 [4] 520/13 590/23 590/23 590/24<br>50 meters [2] 521/12 521/15<br>50 percent [10] 590/16 590/24 590/25 591/7 591/11 591/14 591/22 592/10 595/13 595/16<br>500 [1] 469/2<br>5000 [1] 468/14<br>504 [1] 469/3<br>589-7780 [1] 469/3<br>59 percent [2] 503/8 523/25<br>6<br>6,000 [2] 531/3 531/5<br>6,909 [3] 530/16 530/19 531/3<br>60654 [1] 468/6<br>63 [2] 532/4 532/7<br>655 [1] 468/10<br>6:15 [1] 679/3<br>7<br>70 [1] 503/10<br>701 [2] 467/23 468/14<br>70130 [2] 467/23 469/3<br>70139 [1] 468/15<br>72 percent [2] 503/10 523/25<br>75 [1] 587/18<br>7611 [1] 467/12<br>7780 [1] 469/3<br>78 [3] 561/19 562/2 562/11<br>8<br>8.5 [2] 550/5 550/18<br>80 percent [1] 587/18<br>80,000 [1] 628/13<br>821 [1] 531/24<br>8:00 a.m [1] 679/4<br>9<br>90 [4] 606/15 606/16 617/24 661/8<br>90071 [1] 468/24<br>9105.1 [1] 647/4<br>9105.131.5 [1] 656/9<br>9105.131.6 [1] 656/24<br>9105.14.1 [1] 649/4<br>9105.64.3 [1] 653/11<br>9124.1.5 [1] 643/17<br>9124.13.6 [1] 645/15<br>9124.24.4 [1] 643/24<br>9124.4 [1] 643/1<br>9124.49.1 [1] 653/23<br>9124.55.2 [1] 654/6<br>9124.56.1 [1] 654/17<br>92 [1] 643/1<br>95 percent [2] 583/1 640/24<br>98 percent [1] 520/19 |   |

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| <p><b>A</b></p> <p>actually... [27] 543/21 544/3 544/4<br/>544/19 546/20 546/21 550/17 561/21<br/>561/24 572/5 586/20 596/25 604/10<br/>606/12 606/25 607/4 619/18 620/3<br/>623/5 624/5 628/17 628/22 638/12<br/>640/1 673/3 678/1 679/10<br/>acute [13] 485/14 486/19 486/21 487/3<br/>493/23 516/8 516/8 516/9 516/11<br/>516/16 516/18 517/17 575/13<br/>adapt [3] 512/1 516/19 517/7<br/>adapted [4] 629/8 629/10 631/25 660/25<br/>add [3] 515/17 515/18 515/23<br/>added [1] 631/22<br/>Adding [1] 634/21<br/>addition [4] 504/18 635/7 653/25 675/25<br/>address [4] 624/25 626/3 628/13 629/16<br/>addressed [2] 625/1 666/12<br/>addressing [2] 607/24 628/14<br/>adds [2] 515/24 517/6<br/>Admiral [4] 608/14 643/19 678/9 678/9<br/>Admiral Landry [1] 608/14<br/>Admiral Papp [1] 643/19<br/>admit [1] 541/23<br/>admitted [3] 612/16 612/16 612/17<br/>admittedly [1] 548/24<br/>adopt [2] 477/7 616/13<br/>adopted [1] 625/17<br/>adult [4] 489/12 489/17 504/7 504/19<br/>adults [4] 488/2 488/6 507/12 510/1<br/>advance [2] 659/14 662/24<br/>advanced [1] 659/17<br/>advances [1] 555/2<br/>advancing [1] 670/18<br/>adversely [1] 591/1<br/>advice [2] 606/1 609/24<br/>advise [1] 605/25<br/>Advisory [1] 528/23<br/>aerial [1] 623/8<br/>aerobic [7] 575/22 576/14 577/6 577/7<br/>577/9 577/10 577/15<br/>affect [4] 472/20 481/13 494/24 511/3<br/>affected [9] 486/22 487/9 490/7 494/17<br/>496/7 496/8 498/16 578/1 591/1<br/>affects [2] 481/15 496/17<br/>affinity [3] 481/16 481/17 482/7<br/>afloat [1] 605/22<br/>after [28] 475/12 508/10 518/25 519/22<br/>526/6 527/19 533/18 535/24 536/25<br/>537/17 537/22 540/21 577/2 603/21<br/>605/21 606/8 608/14 625/14 628/16<br/>632/22 633/4 633/16 633/16 660/2<br/>661/21 661/22 667/11 667/17<br/>afternoon [8] 466/18 471/1 471/9 525/5<br/>635/20 641/8 641/9 677/11<br/>afterwards [2] 508/3 664/7<br/>again [43] 517/16 521/13 527/6 530/20<br/>531/18 532/2 533/16 534/2 534/8<br/>535/15 535/19 536/13 537/13 540/20<br/>541/16 552/13 558/19 566/19 567/9<br/>570/24 571/20 573/25 574/4 574/22<br/>578/9 581/1 586/12 588/13 589/13<br/>590/9 594/10 596/3 600/23 619/13<br/>620/15 630/11 630/12 630/23 634/2<br/>639/4 656/24 670/16 678/23<br/>agencies [6] 606/21 609/13 610/9<br/>617/22 622/3 635/4<br/>ago [2] 644/8 658/19<br/>agree [49] 479/24 499/5 513/23 526/10<br/>526/16 527/22 528/13 535/15 544/23<br/>547/3 548/12 548/24 552/24 554/19<br/>563/4 564/11 564/17 572/2 578/18</p> | <p>578/20 587/10 636/24 637/8 641/10<br/>641/18 642/6 642/13 646/7 647/16<br/>649/13 651/23 652/19 652/24 653/3<br/>653/7 654/23 655/14 656/5 660/23<br/>662/18 662/20 664/14 666/1 666/4<br/>670/3 672/13 672/15 672/16 673/4<br/>agreed [3] 669/25 671/2 674/24<br/>agreement [2] 650/20 672/11<br/>ahead [8] 471/23 539/13 545/20 558/10<br/>593/20 602/5 611/20 641/4<br/>aided [1] 469/8<br/>air [3] 635/15 635/16 639/18<br/>al [10] 491/10 491/13 491/22 493/16<br/>493/20 493/23 494/1 494/4 498/3<br/>568/23<br/>Alaska [9] 473/12 473/18 473/19 474/2<br/>499/20 500/14 509/23 587/11 599/14<br/>Alaskan [1] 501/8<br/>Aleutians [1] 474/5<br/>alkanes [1] 480/21<br/>all [142] 471/6 471/7 471/15 471/23<br/>472/18 474/11 474/18 475/14 476/17<br/>477/1 479/21 479/25 480/9 481/22<br/>484/15 484/20 484/22 484/22 485/7<br/>486/6 487/7 489/10 492/1 497/25 498/3<br/>499/18 500/4 500/10 500/12 500/24<br/>501/1 501/18 502/19 506/4 508/6 509/5<br/>510/4 511/13 515/17 520/2 520/9 520/9<br/>520/13 521/20 524/25 528/7 530/7<br/>530/8 531/4 532/21 535/8 535/8 538/1<br/>540/2 541/13 544/2 551/15 551/22<br/>554/19 555/12 555/16 559/21 560/20<br/>561/10 561/10 562/25 563/10 564/4<br/>564/16 564/16 565/1 565/11 566/7<br/>567/21 568/21 570/16 571/17 572/19<br/>573/6 573/9 573/11 573/13 577/1<br/>577/19 580/3 583/8 585/7 585/8 595/6<br/>597/5 597/12 597/16 598/5 598/19<br/>599/12 600/4 601/19 601/25 602/4<br/>602/20 603/8 603/10 607/19 608/22<br/>610/9 615/20 618/24 621/8 624/8 629/4<br/>636/1 636/5 639/21 644/16 646/17<br/>656/21 658/13 660/17 661/6 662/7<br/>662/19 663/19 664/4 664/12 664/24<br/>666/7 669/2 669/10 671/21 672/13<br/>673/21 674/2 675/4 675/24 678/3 678/7<br/>678/10 678/22 678/22 679/3 679/24<br/>680/2<br/>ALLAN [1] 467/21<br/>allow [1] 592/12<br/>allowances [1] 673/16<br/>allowed [2] 633/12 660/7<br/>almost [5] 503/10 524/6 621/6 623/25<br/>655/23<br/>alone [2] 514/10 569/9<br/>along [9] 471/20 474/1 474/13 474/16<br/>476/18 495/15 500/21 555/1 676/7<br/>already [5] 488/17 562/24 608/4 630/13<br/>651/18<br/>also [72] 472/13 474/4 474/17 474/19<br/>477/25 478/5 478/18 478/20 479/14<br/>481/17 482/12 482/20 483/23 486/4<br/>487/15 488/22 491/21 493/14 497/12<br/>497/16 497/17 497/20 500/5 501/13<br/>501/17 504/10 504/18 505/2 508/23<br/>509/25 518/8 518/20 519/2 524/21<br/>536/10 536/11 542/13 543/11 545/5<br/>548/6 570/12 570/17 571/21 572/16<br/>576/15 585/1 585/18 586/10 598/7<br/>599/24 601/24 604/23 606/2 607/3<br/>608/22 609/7 625/19 631/3 631/17<br/>636/2 642/18 642/23 650/5 655/25<br/>657/9 659/10 665/17 666/4 676/8</p> | <p>676/10 677/22 679/8<br/>alter [1] 615/23<br/>alternative [6] 604/24 612/6 625/21<br/>627/5 627/25 629/20<br/>Although [3] 575/19 581/23 586/21<br/>always [4] 509/12 555/6 555/10 598/20<br/>am [9] 473/9 535/15 563/24 568/14<br/>572/18 591/22 641/7 665/21 665/21<br/>AMANT [1] 467/22<br/>amazed [1] 678/3<br/>amberjack [15] 497/8 497/25 503/4<br/>543/12 543/13 549/21 550/13 570/19<br/>571/17 571/18 571/20 571/25 572/4<br/>572/5 572/24<br/>AMERICA [3] 466/8 467/3 670/11<br/>ammonia [2] 473/6 598/18<br/>among [1] 652/17<br/>amongst [1] 525/19<br/>amount [22] 484/5 547/15 614/1 614/8<br/>614/9 615/11 615/12 615/13 615/13<br/>615/14 615/14 615/15 615/16 634/5<br/>638/12 640/4 640/5 640/20 654/19<br/>663/10 663/11 667/10<br/>amounts [2] 622/6 669/11<br/>amphipod [1] 519/5<br/>amphipods [1] 518/20<br/>ANADARKO [4] 466/11 466/12 468/17<br/>601/25<br/>analyses [7] 478/16 478/21 519/11<br/>522/25 524/21 526/22 541/25<br/>analysis [41] 479/23 490/21 491/5<br/>492/11 492/18 492/19 503/21 504/1<br/>507/20 507/21 513/8 513/15 516/1<br/>519/3 520/25 521/22 521/23 522/3<br/>522/9 522/23 523/4 523/7 523/13<br/>532/24 532/25 535/4 538/18 539/24<br/>542/8 556/23 557/14 557/18 557/23<br/>558/2 558/4 570/5 580/13 603/15<br/>603/20 604/21 614/19<br/>analytes [1] 530/8<br/>analytical [5] 529/20 531/19 564/14<br/>565/6 565/12<br/>analytically [1] 598/4<br/>analyze [12] 492/13 492/14 505/2<br/>514/19 526/5 527/23 532/17 532/20<br/>533/1 533/9 556/2 581/1<br/>analyzed [12] 492/13 504/18 528/19<br/>529/7 529/18 530/8 530/11 556/5 556/5<br/>556/9 582/18 597/17<br/>analyzes [1] 513/11<br/>analyzing [4] 514/12 533/19 546/4<br/>555/25<br/>And did [1] 597/19<br/>ANDRE [1] 467/7<br/>ANDREW [1] 468/3<br/>Angeles [1] 468/24<br/>angled [1] 668/19<br/>animal [15] 480/12 482/4 486/2 486/5<br/>487/10 487/14 487/23 494/22 495/3<br/>495/20 495/23 497/18 505/11 509/9<br/>514/7<br/>animal's [3] 507/13 576/14 578/6<br/>animals [11] 488/22 497/11 498/21<br/>504/15 505/17 506/21 511/10 518/2<br/>577/2 589/19 590/25<br/>animation [1] 485/4<br/>ankles [1] 496/10<br/>another [17] 471/16 471/19 480/19<br/>486/2 512/21 534/19 537/5 541/21<br/>558/9 565/23 599/3 620/17 634/1<br/>638/24 651/18 655/25 672/1<br/>answer [8] 561/11 563/10 611/17 648/5<br/>648/7 648/22 670/10 671/11</p> |
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| <p><b>A</b></p> <p>answer's [1] 500/19<br/> answered [2] 562/20 648/19<br/> answering [3] 539/4 539/8 545/18<br/> antibiotics [3] 599/2 599/3 599/9<br/> any [64] 474/9 474/14 475/11 477/2<br/> 492/13 495/4 507/5 514/13 526/14<br/> 527/19 532/24 533/14 541/25 548/16<br/> 554/1 554/4 554/10 556/21 557/23<br/> 558/12 558/15 559/10 559/14 559/15<br/> 564/4 571/6 572/21 575/1 575/5 576/15<br/> 576/15 578/18 578/18 578/25 579/1<br/> 581/1 581/4 584/3 584/5 585/23 588/5<br/> 588/20 588/23 598/22 602/1 602/14<br/> 607/24 612/23 613/12 615/23 615/23<br/> 621/14 624/11 625/22 631/24 632/7<br/> 633/20 633/20 639/20 644/23 650/25<br/> 663/19 663/21 674/16<br/> Anybody [1] 679/24<br/> anymore [1] 597/2<br/> anything [7] 521/7 548/21 559/15 593/9<br/> 672/25 678/19 679/24<br/> anyway [2] 538/17 565/10<br/> apologize [5] 559/4 561/11 611/19 615/3<br/> 675/5<br/> apparently [3] 585/14 671/17 671/19<br/> appear [1] 522/6<br/> Appearances [3] 467/1 468/1 469/1<br/> appeared [1] 580/6<br/> appearing 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