

1 PUBLIC HEARING BY THE PIERCE COUNTY HEARING EXAMINER

2  
3 In Re: )  
4 Administrative Appeal: AE1-10 )  
5 Appellants: Coalition to Protect )  
6 Puget Sound Habitat and Case Inlet )  
7 Shoreline Association )  
8 Shoreline Substantial Development )  
9 Permit: SD22-06 )  
10 Applicant: Longbranch Shellfish, )  
11 LLC )  
12 )  
13 )

14 Excerpt of Transcript of Proceeding

15 Before STEPHEN J. CAUSSEUX, JR.

16 Monday, March 14, 2011

17 APPEARANCES

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14 Also present: Ty Booth, Senior Planner, PALS  
15 Adonais Clark, Environmental Designee, PALS  
16 Dave Risvold, Environmental Biologist, PALS  
17 Jenny Pelesky, Clerk

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24 Reported by: Linda M. Grotefendt, CCR  
25 License No. 3013

1 (Herein begins the first excerpted portion  
2 of the transcript.)

3  
4 (Reporter's note: This witness was not  
5 sworn in.)

6 THE HEARING EXAMINER: I need you to state your  
7 name and address and spell your last name for us, please.

8  
9 NARRATIVE TESTIMONY

10  
11 THE WITNESS: My name is Steven Gilbert,  
12 G-i-l-b-e-r-t. I'm at 8232 14th Avenue Northeast, in  
13 Seattle, Washington 98115.

14 THE HEARING EXAMINER: Do you want Mr. Gilbert just  
15 to testify, or are you going to ask him questions?

16 MS. HENDRICKS: I do have some questions, but I  
17 think he wanted to do introductory comments.

18 THE HEARING EXAMINER: Okay.

19 THE WITNESS: So I'm a toxicologist. I'm a  
20 diplomate, American Board of Toxicology, I'm an affiliate  
21 professor at the University of Washington, and I'm the  
22 founding director of the Institute For Neurotoxicology and  
23 Neurological Disorders.

24 And I got interested in this project because it's the  
25 PVC tubing, which, I think, if you look at the lifecycle of

1 PVCs, you know, it's bad from the get-go, from the  
2 manufacturing process all the way to the disposal. I think  
3 that's one thing that really needs to be considered when you  
4 place this much PVC tubing out into the environment, what  
5 you're doing with that. It's an organochlorine. Actually,  
6 the processing they do uses a huge amount of chlorine to  
7 make PVC. And it's also done with mercury cells, which is  
8 another potential contamination.

9 PCV is interesting because they use a lot of  
10 stabilizers, a lot of different metals. There's no one PVC.  
11 There's all kinds of different kinds. It depends on the  
12 materials in them. For example, we sampled some of them,  
13 and some of them had lead in them, some of them had other  
14 metals in them and use a stabilizer.

15 Your soft rubber ducky might be PVC plastic. Lunch  
16 pails may be made out of PCV plastic. But it's actually the  
17 lunch pail with PVC that had lead in them. So we're talking  
18 about contaminants of a material that's being stuck in the  
19 water there.

20 So from a toxicology point of view, it's dose response.  
21 And one thing we've learned about toxicology in the last 20  
22 years or so is, at very low levels, the effect of chemicals  
23 can be hazardous.

24 You know, lead and arsenic were widely used as a  
25 pesticide in Eastern Washington up until about the end of

1 World War II. And that just shows what we're dealing with  
2 is basically a pesticide. And pesticides work because the  
3 organism is very small. So my concern would be that the  
4 small organisms in the water would be differentially  
5 affected by absorbing material. Lead substitutes for  
6 calcium, so it's easy for the ocean creatures to pick up.  
7 So that's my concern, is that we have very low-level  
8 effects.

9 One thing we've learned about lead is there's no safe  
10 dose of lead, for example. My interest has been child  
11 health-related issues, and all children that are affected by  
12 lead -- you know, it can harm their intelligence, even at  
13 very low levels of lead exposure, down to 2 micrograms per  
14 deciliter.

15 So the problem is we have cumulative effects. We have  
16 multiple chemicals we're being exposed to. And I think  
17 that's something we really should be concerned about and  
18 take -- stop for a second and look at that. Because we have  
19 learned, again and again, it's not a good idea to crash  
20 forward with these projects.

21 I'll use lead as an example again, where lead was put in  
22 lead paints until 1978, and Europe banned lead-based paints  
23 in the '20s. And that's because they took a precautionary  
24 approach to lead, said "we do know about the health  
25 effects," and the United States didn't bother to do that.

1 Same with putting lead in gasoline. It turned out to be  
2 one of the biggest public-health disasters ever created when  
3 they put lead in the gasoline. You might put lead in a  
4 couple cars, but when you expand it and put lead in the  
5 number of cars that were driven, it just doesn't work; drove  
6 the blood levels up of the children.

7 So my concern is that you have a lot of PVC tubing out  
8 there. Not only are you manufacturing it, you have to  
9 dispose of it. It involves dioxin when you dispose of it,  
10 and also during the manufacturing process. So it just  
11 doesn't seem like a good way to go, to put so much PVC out  
12 into the environment without really examining and  
13 understanding the effects of that.

14 I'll leave it there.

15  
16 DIRECT EXAMINATION

17 BY MS. HENDRICKS:

18 Q Okay. Well, how did you analyze the PVC samples that were  
19 provided?

20 A So we went to a safety check, and they have what's called  
21 an X-ray fluorescence instrument, where they -- it's  
22 basically sort of a gun. They point it at the PVC tubing,  
23 and you get back a list of the metals that are in the PVC  
24 tubing. That might be copper or tin, arsenic, lead,  
25 manganese.

1 Q And what chemicals were found in the PVC you had tested?

2 A Well, I think the most interesting one was lead. In two of  
3 the tubes, we found higher levels of lead than we expected  
4 to find.

5 Q Did that surprise you?

6 A Well, not totally, because I think lead is a common  
7 contaminant of PVC. I think that's what kind -- it just  
8 depends on the tube and the manufacturing process. So I  
9 wasn't totally surprised with that. But it was above the  
10 level for the Consumer Product Safety Commission.

11 Q And were there any other chemicals of concern in your  
12 analysis?

13 A There was also arsenic and some other chemicals in there  
14 that we found. But I think the lead was, to me, the major  
15 concern. You know, we found some -- you know, another  
16 concern would be copper, because it affects the olfactory  
17 system of salmon.

18 Q Now, were they at high levels, or at levels that were  
19 normal?

20 A I think that most of the chemicals -- I think lead was the  
21 only one that really stood out as being above -- that we'd  
22 really be concerned about. But I think you have to be  
23 concerned about all these chemicals, in a sense, because  
24 PVC is being shredded by the sand and being distributed out  
25 in the environment. And like I mentioned, the very small

1 organisms pick up small amounts of these chemicals. And it  
2 is very much about the dose, and the small amounts can  
3 affect small organisms.

4 Q Now, what are the potential impacts of these chemicals if  
5 they enter the marine environment, which is different than  
6 directly into our daily lives, being in lunch buckets and  
7 things like that?

8 A Well, I'm not an expert on the marine environment, but my  
9 concern would be that it would be harming the reproductive  
10 and developmental effects of the smaller creatures. There  
11 are some studies that show that some of these chemicals can  
12 harm the reproductive effects of fish, ability to swim and  
13 move in the environment.

14 Q Now in lead, that's always been a concern. People hear  
15 about lead. Can you give us more information on that?

16 A So lead is a very interesting compound. We've all --  
17 everybody here has been exposed to a little bit of lead. I  
18 grew up being exposed to lead. But, you know, it affects  
19 your intelligence, it affects your ability to learn and  
20 remember. Particularly, children are vulnerable. For  
21 example, children absorb about 50 percent of the lead they  
22 ingest, whereas adults only absorb about 10 percent of the  
23 lead they ingest, because kids are absorbing more calcium,  
24 because lead substitutes for calcium.

25 So organisms that are dependent on calcium will absorb



1 more lead than other organisms. And that's really a big  
2 concern. Children, elevated blood leads, and it has to go  
3 up above 2 micrograms per deciliter to have potential  
4 health effects.

5 THE COURT REPORTER: Excuse me, sir. Would you  
6 slow down?

7 THE WITNESS: Oh. Sorry.

8 Q As far as copper, what have you found?

9 A Copper? Copper affects the olfactory system of salmon. I  
10 think that's very important for when they're finding their  
11 way back. And we just -- in Washington state, they moved  
12 to ban copper in brake pads because of concern about copper  
13 getting into the water system and affecting the salmon  
14 being able to return to their habitat.

15 Q Are there other components of PVC that threaten the aquatic  
16 environment?

17 A I think that arsenic is another one. Fish are sensitive to  
18 arsenic, and the aquatic organisms take up arsenic. And I  
19 think that's another one. I think you just run down the  
20 list, if you wanted to, and look at the different potential  
21 there. And I want to emphasize again, it's not just one  
22 element these creatures are exposed to. They're exposed to  
23 multiple of these chemicals.

24 Q Now, we've heard a lot about organotins, and then we'd sent  
25 those concerns in to the County; several different people

1 have.

2 What are your thoughts on organotins?

3 A Well, organotins, butyl tins, are pretty toxic. They  
4 affect the organism. They're taken up by the liver and the  
5 kidneys. They can affect the nervous system also. In  
6 fact, tin is one of them that you do want to pay attention  
7 to.

8 Q On leaching. Did you look into that?

9 A Lead does leach out. We did look at that, and lead is one  
10 of them that is known to leach out of PVC pipes, PVC  
11 tubing. And there's been, like -- and we have good data on  
12 this also, from exposure to children to blinds in homes and  
13 the lead coming out --- come right off the blinds, for  
14 children.

15 Q Now, are there any studies or any information on cutting a  
16 pipe, how it affects leaching?

17 A Well, I think that cutting just increases surface area, and  
18 I think one of the interesting things about cutting the  
19 pipe is where that is being done in a particular -- the way  
20 they cut the pipe. Because my understanding is it's just  
21 cut with, like, a big buzz saw or hand saw, and where do  
22 those small materials go?

23 And remember, with these small materials, you increase  
24 the surface area, and that increases availability of any  
25 kind of contaminants in the PVC.

1 Q Now, do you have information on Taiwan, that the oysters  
2 were found with some kind of issues?

3 A We've -- they took up tin, right?

4 Q Organotins.

5 A Organotins, right. They took up organotins. There's one  
6 study that pointed out oysters taking up organotins.

7 Q And toxicity. What are your thoughts on that?

8 A As far as tin goes?

9 Q No. Just on toxicity in general.

10 A Toxicity in general. You know, I think we need to be more  
11 thoughtful about the chemicals we expose both the  
12 environment to -- and I think we do have an ethical  
13 responsibility to ensure that, even in the environment --  
14 we have an environment where all creatures can reach and  
15 maintain their full potential.

16 And we throw out extra compounds, whether it's lead or  
17 mercury or tin or arsenic, into the environment. We need  
18 to be thinking about that and making sure that it's not  
19 harming, particularly, developing organisms.

20 Q Dibutyl tin -- I don't know if I said that correctly.

21 A Yeah. Butyl tin. Dibutyl tin.

22 Q Butyl tin is itself a potent toxin?

23 A Yes.

24 Q Can you elaborate a little bit?

25 A Dibutyl tin -- you know, it affects the -- can affect the

1 nervous system. It is taken up by the kidneys and spleen,  
2 and, you know, general toxic materials.

3 Q How do you feel about the absence -- are there studies, or  
4 the absence of studies on this issue?

5 A I think there are some studies that would raise concern.  
6 But, in general, I think there needs to be a lot more work  
7 in this area. You know, we've learned from many lessons in  
8 the past that it's not a good idea to rush through. I am a  
9 proponent of the precautionary principle. You know, before  
10 we put new drugs into the marketplace, we have --  
11 pharmaceutical companies or biotech companies have to  
12 submit a lot of data to the FDA to demonstrate both  
13 efficacy and safety of their product. And I think that we  
14 need to be taking a more precautionary approach before we  
15 put in miles and tons of PCV into the aquatic environment  
16 with -- that do have other contaminants in the PVC tubing,  
17 and being thoughtful about where this PVC tubing comes from  
18 and how we dispose of it later on, as well as the nets and  
19 rubber bands. There's a lot of material.

20 Q Now, the impacts on fish. What were your thoughts on that  
21 issue?

22 A Well, I'm certainly not an expert on the fish, but my  
23 concern would be that a lot of these things, these  
24 materials, bio-accumulate and bio-concentrate. The fish  
25 are small. They take up the small organisms -- or the

1 small bits of the PVC tubing that come off, or even pieces  
2 of it that come off, and that could cause them harm.

3 Q When you talk about little bits that come off, did you  
4 notice that, in the vast number of tubes that we brought  
5 you, that were collected off beaches near the geoduck sites  
6 -- and they were different beaches, different places -- did  
7 you notice a difference on the ones that had been in the  
8 water versus a piece of PVC that was just -- if you just  
9 got it off a shelf?

10 A Oh, yeah. You could see that they were scarred. Some of  
11 them were broken, had little chunks taken out of them. And  
12 there was also barnacles growing on some of the PVC tubes.

13 Q Now, by "scarred" -- when you're talking about that, does  
14 that mean that little plastic particles are going into the  
15 water?

16 A I would assume that they are. I'm assuming that the sand  
17 is just abrading them, like sand is -- like sandpaper. The  
18 sand -- on the beaches, it's moving back and forth, and  
19 that sand abrades that just like it would, you know, stones  
20 or anything else on the beach. That PVC tubing is being  
21 abraded.

22 It would be an interesting study to do, actually,  
23 would be to look at that. And I think that's one of the  
24 studies that could be done, is to put PVC out there and  
25 then look at the change in weight of the PVC tubing and

1 find out a little bit more about what is the degradation of  
2 PVC tubing. I know they -- my understanding is they last  
3 about -- they use them for about 10 years, use them  
4 multiple times. You know, it would be interesting to  
5 understand: How much PVC are we just putting back into the  
6 environment in small plastic bits?

7 Q It's been used for 10 years in the aquatic environment.  
8 What's the life of the normal PVC that you put in the built  
9 environment?

10 A In the built environment, it can last a long time, and it's  
11 a fairly stable product.

12 Q What's "a long time" for a standard PVC?

13 A You know, I -- you know, 50 years. It can last a long  
14 time.

15 Q So why are these only usable for 10?

16 A Well, I assume it's because they're being abraded by the  
17 water and they're sort of getting chipped and broken.  
18 You've also got the sunlight, you've got ultraviolet  
19 radiation that affects the integrity of the product.

20 Q Now, one thing that -- I know there was a report that Mr.  
21 Puddicombe had done. It was a recap of different PVC  
22 articles that he had seen.

23 Could you talk about the report that Dr. Joe Thornton  
24 had?

25 A Thornton did a really interesting look at PVC, sort of from

1 the manufacture to the disposal of them, looked at the  
2 different contaminants. I would recommend it to everybody  
3 that's using PVCs or is interested in PVCs. It's a very  
4 nice summary of the potential contaminants, the toxicants,  
5 in the creation of PVC, the chlorine that's used, and then  
6 all the way to the disposal and dioxins. He runs through a  
7 list of different contaminants that are in the PVCs as well  
8 as looking at the manufacturing and disposal process. It's  
9 an excellent report.

10 Q Now, I'm sure -- we didn't talk about this, but I'm sure  
11 you know what I'm going to ask. Do you see probable and  
12 significant impacts of using PVC in our marine waters?

13 A Absolutely. I think we don't understand anywhere near  
14 enough. I think there is high probability of significant  
15 probable impacts of PVC tubing, particularly at the extent  
16 of its use.

17 You might be okay if you had the Boy Scouts and the  
18 Girl Scouts doing a little aquaculture in their backyard,  
19 trying this stuff out with a couple tubes. But when you  
20 expand it and use acres of tubes, which is miles of tubes  
21 and tons of PVC, you've got to be concerned about the  
22 impact on the environment.

23 Q Do you have any next steps? What would you recommend that  
24 would be done, based on this issue?

25 A I would recommend that we slow down and do some thoughtful

1 studies about this stuff and require the people that are  
2 actually -- probably already have aquaculture going on --  
3 to require them to do some studies and require maybe some  
4 standards about PVCs.

5 And one thing I really look for is alternatives.  
6 What's an alternative to doing this process? This is a  
7 cheap and easy way to grow geoduck. Are there better ways  
8 or different ways? I have no problem with geoduck farming,  
9 but is it potentially -- are there different ways to do it?  
10 Should it be done so intensively? Should it be done --  
11 instead of every foot, should it be done every yard? You  
12 know, there are many ways to go on something like this.  
13 And I think those things need to be explored and studied.

14 Q As far as the -- you reviewed Rita Shanks' -- is it  
15 Shanks? -- report. Did you have any comments on that, as  
16 far as concerns or comments you wanted to make?

17 A Not particularly.

18 Q I think that one thing that we talked about not too long  
19 ago was the concentration of chromium, silver, and lead in  
20 the virgin PVC.

21 A And this just is the plethora of contamination that comes  
22 with the product. If you run down the list, chromium is  
23 certainly hazardous; it affects the kidneys. Silver is  
24 actually an interesting one, because silver is being used  
25 as a nanoparticle, and I think this nano-sized material is



1 taken up by the fish and can harm fish. It's pulled into  
2 the fish kidneys. It actually moves up in their central  
3 nervous system.

4 Q Now, are you concerned about cumulative effects?

5 A Well, absolutely. I think that's one thing we've learned  
6 in toxicology, is you have, for a period of time, these  
7 effects build up. A lot of these chemicals are  
8 bio-cumulative, bio-concentrate.

9 Mercury is probably the one people have heard about  
10 most, where it easily -- it turns into methyl mercury and  
11 bio-accumulates in fish and moves up the food chain. I  
12 think we should definitely be concerned about that.

13 Q I guess my last question -- and Curt had a couple -- would  
14 you eat geoduck grown in a PVC tube? Do you think it's  
15 safe?

16 A (Witness coughing.)

17 Q Sorry. I didn't mean to choke you up.

18 (Laughter.)

19 THE WITNESS: You know, no, I probably wouldn't do  
20 that. You know, I think we should be -- you know, just on  
21 principle, that that's just -- you know, we need to be  
22 thinking about what we're doing. You know, we have a habit  
23 of externalizing the cost onto the environment and on human  
24 health, and I would avoid that just because I don't like the  
25 process. I don't think we've put enough thought into the

1 process that we're using to grow geoduck. Maybe there's a  
2 better way. Maybe this is not the way to go. Maybe there  
3 should be restrictions on the number of geoduck you grow per  
4 acre to ensure that all aquatic organisms aren't being eaten  
5 by the geoduck. I would just avoid geoduck both from a tox  
6 perspective, potential from the PVC, and from the basic  
7 process, which I disagree with.

8 MS. HENDRICKS: Curt has a few questions.

9  
10 DIRECT EXAMINATION

11 BY MR. PUDDICOMBE:

12 Q So you said that there would be different formulations of  
13 PVC, right?

14 A Correct.

15 Q So from maybe one manufacturer to another, a different  
16 formulation?

17 A Right.

18 Q Maybe even from the same manufacturer?

19 A Possibly.

20 Q So the PVC sewer pipe -- it's designed to be buried in the  
21 ground.

22 A Correct.

23 Q So under the condition of geoduck farming, I assume, then,  
24 that -- you said that that wears -- it wears down from  
25 being exposed to the environment.

1 A Right.

2 Q Whereas you wouldn't be as concerned about it if it was  
3 under the ground, as in a built environment, as designed?

4 A Right.

5 Q Okay. Thank you.

6 A It's also carrying sewage and not my food.

7 MR. PUDDICOMBE: Right. Exactly. Thank you.

8 MS. HENDRICKS: Thank you, Steve.

9 THE HEARING EXAMINER: Ms. Kisielius or Mr.  
10 Plauché?

11

12

#### CROSS-EXAMINATION

13 BY MS. KISIELIUS:

14 Q Dr. Gilbert, my name is Laura Kisielius. I'm one of the  
15 attorneys for Longbranch Shellfish. I have a few questions  
16 for you. Maybe more than a few.

17 Your report was prepared by -- or at least it had your  
18 name and Nick Thorp's name on it. Was Nick Thorp the  
19 primary author of the report?

20 A Yeah. He did the first review of the report.

21 Q And who is Nick? Does he work with you?

22 A He works with me at the Institute For Neurotoxicology and  
23 Neurological Disorders. He's my research assistant.

24 Q Okay. And what is his educational background?

25 A He has a background in environment, and he is a graduate at

1 the University of Washington.

2 Q An undergraduate, or a graduate?

3 A He graduated as an undergraduate.

4 Q Okay. And did you read all of the studies that Mr. Thorp  
5 cited in the report?

6 A I looked through them all. I didn't read them all.

7 Q And are you basing, in part, your opinion on the studies  
8 that were cited in your report?

9 A Yes.

10 Q So can I ask you what -- what issue, with regards to this  
11 case, exactly did the Appellants ask you to analyze?

12 A They asked me to look into what are the potential toxic  
13 effects of PVC and the materials that PVC is made up of and  
14 if I had any concerns about PVC tubing.

15 Q Okay. And your report mentions the figure 2,000 tons of  
16 PVC, potentially--

17 A Right.

18 Q --in the Puget Sound waters. What is that number?

19 A You know, I was just given that number. I was told that  
20 that was approximately what was put out into the  
21 environment now, with the multiple acres and the number of  
22 -- you know, if you add up 10 -- I didn't do the  
23 calculations. They're 10 inches long or a foot long. You  
24 add up all the material.

25 Q Did that number factor at all into your analysis?

1 A Well, I think it's always in the background of the  
2 analysis, because you're looking at a huge amount of  
3 tubing, and that comes into the variation of the tubing,  
4 you know, the variation in the size of tubing.

5 The tubing I saw varied in size, varied in  
6 composition. Some was white, some was gray. So there's  
7 many different kinds. And you look at those numbers.  
8 That's a lot of tubing, a lot of variation, a lot of  
9 variability.

10 Q Right. Do you happen to know, then, how much tubing is  
11 proposed to be used for the farm that's the subject matter  
12 of this hearing?

13 A Well, I just heard just the testimony that was just given,  
14 how much was going to be put into the ground there.

15 Q Okay. And then, from that, do you have a figure of how  
16 much -- you know, compared to the 2,000 tons of PVC, how  
17 much is --

18 A Well, you can run the numbers pretty easily, given what was  
19 told there, about distance and 10 inches long, things like  
20 that.

21 Q Okay. So when you performed your analysis, were you  
22 looking at the potential impacts of the use of PVC for  
23 geoduck farming throughout the Puget Sound, or were you  
24 looking at this particular farm?

25 A I was thinking about, you know, a little bit of both. I

1 mean, I think my concern was just the sheer volume of PVC  
2 tubing used in the farming environment. But I think that  
3 is a huge concern. The cumulative impact is very  
4 important. You can't look at things in isolation. We've  
5 made that mistake a million times. Maybe not a million  
6 times, but certainly, chronically, we have made that  
7 mistake, of not looking at cumulative impacts of what we're  
8 doing. And I think that is a serious concern in this  
9 operation.

10 Q So when you reached the conclusion of probable significant  
11 impacts from the use of PVC for geoduck farming, was that  
12 based on this cumulative look at that use in the Puget  
13 Sound?

14 A I think that -- yes. I mean, and also, beyond that,  
15 looking at the lifecycle of PVC tubing is a great concern  
16 to me, because you have that material -- the manufacturing  
17 process is toxic. You've got a lot of contaminants  
18 associated with that, to the use, and then the disposal.  
19 The use in particular -- it's out in the open environment.  
20 It's degraded by the sand. It's degraded by the sun. So  
21 there's a lot of different interesting complications in the  
22 use of PVC in the open environment, like you're doing with  
23 geoduck farming.

24 Q Okay. So your report mentions, and you spoke a little bit  
25 about, data that was gathered from the chemical analysis

1 performed by Essco Safety Check.

2 A Correct.

3 Q Did you rely on this data in reaching your conclusion?

4 A Yes.

5 Q And how many tubes were evaluated in that study?

6 A Probably over a dozen.

7 Q Over a dozen?

8 A I can provide the report if you want.

9 Q That would be great. Do you have it with you?

10 A I don't have it.

11 Q Do Appellants have a copy of it?

12 MS. HENDRICKS: Do we have a copy in -- was that  
13 submitted with the expert reports? I can't remember. We'll  
14 get it to you.

15 THE WITNESS: I can provide it. I have it on the  
16 computer.

17 Q Okay.

18 A It's very nice. It was a very elaborate report. It's got  
19 pictures of each tube that was analyzed and the analysis  
20 right next to the picture. So I'll give you the full  
21 report.

22 Q And how did you acquire the tubes?

23 A They were provided to me by the Appellants.

24 Q Do you know where they found them, where they purchased  
25 them?

1 A No. I was not -- no. I was just told they came out of the  
2 aquatic environment.

3 Q Okay.

4 A They appeared to be -- that appeared to be the case. They  
5 had barnacles growing on them. They obviously had been out  
6 in the aquatic environment.

7 Q Do you have any idea how long they had been used or --

8 A No idea.

9 Q Did you happen -- in that test, did you perform any kind of  
10 comparison of the old tubes, the tubes that have washed up,  
11 with new tubes?

12 A No. I did not go out and purchase any new tubes. But I  
13 did think that would be worthwhile, because I was not using  
14 the tube -- I did not know what tubes -- where they were  
15 purchasing their tubes from. When you go to the store, you  
16 know, whether you're going to buy sewer tube or whatever it  
17 is. I don't know. I don't know the weight or what they --  
18 there's a lot of variables. I have no idea what the  
19 aquaculture people do.

20 Q So from that report, could you tell me what the  
21 concentration levels of arsenic were? Do you need your  
22 report for that?

23 A I don't have the report. Yeah, I'd need the report, yeah.

24 Q Okay. And when you spoke about elevated levels of lead, do  
25 you remember what the concentrations were?



1 A I do not. And I know it's above the Consumer Product  
2 Safety Commission's recommendation for consumer products.

3 Q Okay. Could you tell us a little bit about that Consumer  
4 Products Safety recommendation? What is the purpose of  
5 that?

6 A The Consumer Product Safety recommendation tried to limit  
7 lead exposure, particularly for children, in products and  
8 toys. So they put out a classification for paint and for  
9 lead material.

10 Q So paint.

11 A Paint is a big one.

12 Q And you said lead in --

13 A And lead in the product. You know, it could be in PVC, it  
14 could be in other things.

15 Q So for any product?

16 A Any product.

17 Q Okay. So what is your experience with exposure assessment?  
18 Your background in exposure assessment.

19 A You know, direct experience with exposure assessment -- I  
20 don't do exposure assessment. My interest is in child  
21 health-related issues. I'm certainly aware that exposure  
22 is a big deal, and you look at whether it's dermal  
23 exposure, whether it's oral exposure. I can certainly talk  
24 about exposure. But I do not do, myself, exposure  
25 assessment.

1 Q Okay. Are you familiar with the expression "dose makes the  
2 poison"?

3 A Yes, and I generally disagree with that expression.

4 Q Okay. Can you tell us what that expression means?

5 A It means the dose in a material. It's dose response, is a  
6 better way to think of it. You have a dose of something  
7 and you get a certain response. You know, for example,  
8 caffeine. We're all familiar with caffeine. If you take a  
9 dose of caffeine, you get a certain amount of response. We  
10 modulate our exposure to that to moderate the response we  
11 want from caffeine.

12 Most chemicals, like lead and others, we can't feel  
13 the response if it dulls our nervous system down. But dose  
14 response -- but I think the most important thing about dose  
15 response is not the "dose makes the poison," but it's  
16 individual sensitivity.

17 Like, you take alcohol, for example, and fetal alcohol  
18 syndrome. The woman, that mother, is not affected by the  
19 alcohol except, you know, when she drinks. But the fetus  
20 is very sensitive to that. So it's really -- individual  
21 sensitivity is critical when you talk about dose response.

22 And I think -- one more comment about that. You know,  
23 I mentioned pesticides earlier. And you'd think dose  
24 response -- as an example, we can all, as adults, be  
25 exposed to a little bit of a pesticide, and pesticides

1 affect our nervous system just as well as insects. But  
2 because they're exposed to a very small amount but they're  
3 very small, it's a big dose. So dose is a measure of body  
4 weight, relative to body weight, where exposure is just how  
5 much you've gotten, and you can break it down into more  
6 whether it goes to a target organ or it's just how much  
7 you've ingested.

8 Q So what's important to you is the individual sensitivity  
9 and not so much the dose, or not the dose at all?

10 A Well, I think the dose is, of course, very important, but I  
11 think you have to remember individual sensitivity is a  
12 critical part of that. That's why I really disagree with  
13 "the dose makes the poison." I mean, technically, that's  
14 correct. I mean, but you have all these other factors you  
15 have to take into account.

16 Q Okay. Like, what other factors?

17 A Like individual sensitivity. Like a developing organism.  
18 Like that fact that, during -- a child absorbs more lead  
19 than an adult does. A child, as I mentioned, absorbs 50  
20 percent of the lead. An organism that doesn't use a lot of  
21 calcium will absorb more lead than adults do, but adults  
22 will only absorb 10 percent. So you might be exposed to  
23 the same amount, but the lead that enters the body is much  
24 greater for the child than for the adult. And that's the  
25 kind of thing that "dose makes the poison" does not take

1           into account.

2   Q       And then, with regards to marine organisms, are you  
3           familiar with individual sensitivities of different  
4           organisms that might be found in --

5   A       No, I'm not. But I think that's an interesting question.  
6           You look at small organisms, and they're going to have the  
7           same thing. A small organism exposed to just a little  
8           bit -- that's going to be a big dose to the small organism.

9   Q       But you would still have to have some dose for that  
10          individual sensitivity to kick in?

11   A       Right. You have to have some exposure or dose.

12   Q       The Essco Safety Check test in the report -- does it tell  
13          you anything about the potential for the tubes to leach?

14   A       No, it does not.

15   Q       And you had mentioned that you know that PVC leaches lead.  
16          On what do you base that?

17   A       It was done by a study -- I can look up the reference, but  
18          it was a study that showed that PVC leaches lead.

19   Q       Do you know at what rate it leaches?

20   A       No.

21   Q       Do you know if PVC leaches other chemicals, other metals?

22   A       I think you have to assume it does. I'm not an expert in  
23          PVC, but I think that the other thing is, the environment  
24          is the abrasion from the sand, which is going to chunk out  
25          the metals that are in there and in small plastics, and

1 that's going to leach -- create more of a leaching effect.

2 Q So when you were evaluating this issue, were you assuming a  
3 certain dose or rate of leaching of chemicals from PVC into  
4 the marine environment?

5 A No. I think we've gone down that before, too, with  
6 lead-based paint. You know, it's not so much -- you know,  
7 lead-based paint is all around, and the concern is that  
8 children and other people come in contact with lead-based  
9 paint. And it gets in the dust, and dust easily is  
10 absorbed. So my concern was that it's there, and is that a  
11 good thing to put out in the environment? It can increase  
12 potential for exposure to people and aquatic environment.

13 Q When you were talking about the lead in blinds, was that  
14 the PVC mini blinds?

15 A Right.

16 Q Wasn't that the case that what was happening, to the extent  
17 that that particular mini blind was leaching lead, it  
18 happened to be sitting on top of a mini blind, not moving  
19 around? It was collecting for, potentially, years?

20 A You mean the dust on the mini blinds?

21 Q Correct. Right.

22 A I assume that -- my understanding was it was coming out of  
23 the mini blind, but I'm sure the dust from the mini blind  
24 was probably a factor in it too. Because depending on if  
25 there was lead in the household paint or things like that,

1 or there was lead in the dust in the environment.

2 Q And that would affect -- if the lead was accumulating over,  
3 you know, a period of years, that would be a dose -- that  
4 would go back to kind of the dose issue.

5 A That would go back more to the exposure issue. But you're  
6 right. I mean, I assume people clean their blinds once in  
7 a while, so it's not --

8 Q You haven't been to my house.

9 A Oh.

10 (Laughter.)

11 Q Okay.

12 A How old is your house?

13 (Laughter.)

14 Q Did you make any assumptions about dispersal potential of  
15 any potentially released contaminants from the PVC?

16 A No.

17 Q No?

18 A No.

19 Q It is quite likely, though, that, if PVC were to leach in  
20 the marine environment with wave action, that kind of --  
21 unlike the mini blind situation, where it might be  
22 accumulating, you would have movement, dispersal?

23 A Right. Absolutely.

24 Q You wouldn't have such high concentrations?

25 A Right. It's going to be washed in and out, things like

1 that. But I think the interesting thing would be the  
2 geoduck living inside this PVC that's leaching out a little  
3 bit. Are the geoduck taking up any more if they're using  
4 lead -- if lead is a contaminant in the PVC tubing that  
5 they're using, is that lead getting into the geoduck at  
6 all?

7 I think that would be an interesting thing to look at.  
8 And you're right that you would dilute -- I mean, the  
9 solution to pollution is often dilution. Now, hopefully,  
10 we've gotten beyond that, too.

11 But that's sort of what you're saying, is because  
12 you've got the PVC tubing, you've got the wave action,  
13 you're just diluting this stuff out, and that is, again,  
14 not the way to go.

15 You know, we've got all kinds of particles and plastic  
16 particles in the ocean now, and we're not -- it's not being  
17 diluted well.

18 Q In order to understand any potential effects of leaching  
19 lead on geoduck, would you need to -- again, going to the  
20 individual sensitivity, would you still need to know the  
21 dose -- whether the PVC was leaching and at what rate and  
22 at what dose?

23 A Yeah. Yeah. Yeah, you'd have to investigate all that  
24 stuff.

25 Q Okay. And at this time, you don't know that? You don't

1 have the information?

2 A No. No idea.

3 Q So you mentioned the precautionary principle.

4 A Uh-huh.

5 Q Could you describe that a little bit more?

6 A The precautionary principle is a great question. I love  
7 the precautionary principle. So it really says "do no  
8 harm." And it has several components to it, and the basic  
9 one is do no harm.

10 One is to take action even in the face of uncertainty.  
11 So even if you're not sure about something, you take  
12 action. And, for example, the tobacco industry. It did a  
13 great job of clouding the issue whether tobacco consumption  
14 really caused cancer. And there was a lot of raising the  
15 issue of uncertainty.

16 There's a great book by David Michaels called "Doubt  
17 Is Our Product." He goes through this and talks about  
18 industry and manufacturing uncertainty around issues, to  
19 delay regulation. So that's one of the key principles of  
20 the precautionary principle, is to take action in the face  
21 of uncertainty.

22 The other key principle is look for alternatives. Is  
23 there an alternative way to do things? Is there another  
24 way that's less toxic, less hazardous to human health or  
25 the environment? And one of the other basic principles is



1 taking into account both human health and the environmental  
2 health.

3 And the final principle is -- I had it and I lost it.  
4 There's another principle there.

5 Oh, propose -- the activity must take a burden of  
6 responsibility. And the example I gave of the FDA is a  
7 great one, because the Food and Drug Administration  
8 requires pharmaceutical and biotech companies to show their  
9 products efficacious and safe. So they have to take the  
10 burden of that because they're the ones that are going to  
11 make the money from the product.

12 We do not have a --

13 THE COURT REPORTER: I'm sorry. Slow down. "You  
14 do not have a" --

15 THE WITNESS: I know. I get excited. It's exciting  
16 stuff.

17 MS. KISIELIUS: He said he really likes the  
18 precautionary principle.

19 THE WITNESS: Yeah, I do. So the Food and Drug  
20 Administration requires efficacy and safety studies before a  
21 new product goes into the environment. We do not do that  
22 for chemicals that are put in the environment.

23 For example, bisphenol-A. We have billions of pounds of  
24 bisphenol-A, about 7 billion. And everybody in this room  
25 secretes a little bit of bisphenol-A in their urine.

1           There's a little bit of bisphenol-A we're all exposed to,  
2           and nobody in this room ever gave permission to be exposed  
3           to that.

4           And we continued to make that mistake before. And what  
5           -- that's sort of, basically, the precautionary principle  
6           and why I think we need to have a different approach to  
7           chemical management.

8           Washington state -- there was a bill this session in  
9           Washington state trying to have a different chemical policy  
10          to give Ecology more authority to run chemical management.  
11          There's a national bill trying to redo toxic substances to  
12          control that, to change the way we manage chemicals in the  
13          environment.

14          And this business with PVC, putting it out into the  
15          ocean, the aquatic environment, is sort of the same thing.  
16          We're putting a lot of stuff out there, and we don't  
17          understand what we're doing. So that would be the  
18          precautionary principle.

19          So my thing with the precautionary approach would be  
20          that you'd want to take -- slow down a little bit, require  
21          Industry, who, to -- my understanding is, makes a lot of  
22          money from this process, to do the research and ensure it  
23          can be done safely and we have some rules and regulations  
24          around it, which I think is important, to make sure we're  
25          not harming the environment or the creatures in the

1 environment.

2 Q So one of the principles of the precautionary principle is  
3 to take action in the face of uncertainty?

4 A Correct.

5 Q Would you then say that the use of PVC for geoduck  
6 aquaculture, the potential impacts of that with regards to  
7 the chemicals in PVC -- is that uncertain?

8 A Yes. Yeah. I think it is uncertain. I think, given the  
9 volume used, it's uncertain.

10 MS. KISIELIUS: Those are all the questions I have.  
11 Thank you.

12 THE HEARING EXAMINER: Ms. Guernsey, do you have  
13 any questions?

14 MS. GUERNSEY: No, I don't.

15 THE HEARING EXAMINER: Ms. Hendricks, anything on  
16 redirect?

17 MS. HENDRICKS: Mr. Puddicombe.

18 THE HEARING EXAMINER: Or Mr. Puddicombe.

19

20 REDIRECT EXAMINATION

21 BY MR. PUDDICOMBE:

22 Q Dr. Gilbert, we didn't ask you what to do when we came to  
23 you with this, right?

24 A No.

25 Q We just -- right, we just pointed it out to you and said,

1           you know, "what do you think"?

2   A       Right. Right. You just came and said, "Well, what's with  
3           PVC?"

4   Q       And potentially, these problems would be worse in these  
5           high-value habitats, do you think?

6   A       Well, I would speculate that. I'm not a habitat person.  
7           I'm not an ecological toxicologist.

8   Q       Okay. And we tried to get a sample to you from the  
9           proponents, I believe.

10   A       Correct. You mentioned that.

11   Q       And we couldn't get one.

12   A       Correct.

13                   MR. PUDDICOMBE: Okay. Could I say how I got the  
14                   weights? Is that all right, sir? I was the one that  
15                   calculated, did the calculation.

16                   THE HEARING EXAMINER: Okay. Go ahead.

17                   MR. PLAUCHÉ: I'd just ask that, if he's going to  
18                   testify, he be sworn in.

19                   THE HEARING EXAMINER: Okay. Well, Mr. Puddicombe,  
20                   do you want to stand and raise your right hand?

21                   MR. PUDDICOMBE: Sure.

22

23                               CURT PUDDICOMBE, having been first duly  
24                               sworn upon oath by the Hearing Examiner, testified as  
25                               follows:

1 NARRATIVE TESTIMONY

2  
3 THE WITNESS: Okay. There was a forum on DNR. We  
4 had a forum, and it was a geoduck grower, Peter Downy. He  
5 actually weighed a PVC tube, and he put that on the forum,  
6 and I took that number.

7 And then, based on the current number of acres in  
8 production, I took one-third of that, assuming that  
9 one-third of the time -- you'd have tubes in the ground only  
10 one-third of the time. And that's where I got that number  
11 from.

12 And so that's actually a conservative number, because a  
13 lot of geoduck growers use 6-inch pipe, and I actual weighed  
14 that myself, and that was one and a half pounds each. But  
15 with 4-inch pipe, that Peter Downy weighed, it was 16 tons  
16 per acre. And with 6-inch pipe, it was twice that. It was  
17 33 tons per acre, on that calculation.

18 THE HEARING EXAMINER: So what was your -- wait a  
19 minute. Did you have a question that you were going to --

20 MS. HENDRICKS: I was going to have him ask it,  
21 but --

22 MR. PUDDICOMBE: No. I'm sorry. I'm done.

23 THE HEARING EXAMINER: Okay. I just -- I had  
24 thought that was kind of a -- you were indicating how you  
25 came up with the -- was kind of a precursor to a question

1           that you were going to ask.

2           THE WITNESS: Oh. No. I mean, it was -- they  
3           asked the question, and I just wanted to make sure they got  
4           an answer.

5           THE HEARING EXAMINER: Oh. Okay.

6           THE WITNESS: So it was actually -- Ms. Kisielius,  
7           I was trying to answer your question.

8           THE HEARING EXAMINER: Okay. All right.

9

10   REDIRECT EXAMINATION

11 BY MS. HENDRICKS:

12 Q       Ms. Kisielius asked a question: If this is uncertain. Is  
13       it still, in your mind, uncertain, but it's probable and  
14       significant?

15 A       Yes.

16           MS. HENDRICKS: Thank you.

17           THE HEARING EXAMINER: Anything further, Ms.  
18       Kisielius?

19           MS. KISIELIUS: No.

20           THE HEARING EXAMINER: Ms. Guernsey?

21           MS. GUERNSEY: No.

22           THE HEARING EXAMINER: I just had one question I  
23       wanted to ask. As a toxicologist, then, do you have any  
24       type of recommendation, as far as material -- as far as what  
25       you know now, as far as the material that should be used in

1 the geoduck industry?

2 THE WITNESS: No, I don't. I've actually thought  
3 about that, and that would be an interesting thing to look  
4 into further. But I couldn't come up with any quick  
5 answers.

6 I mean, one of my thoughts is maybe something like  
7 bamboo, but, you know, I think that's something that should  
8 be explored, you know, a lot more carefully.

9 THE HEARING EXAMINER: As far as your precautionary  
10 principle, do you know, is that set forth in any type of  
11 legal authority or standards that you know of?

12 THE WITNESS: It's actually in the introduction to  
13 the Seattle 10-year plan. You know, the City 10-year plan.  
14 San Francisco has it in their approach to decision-making.  
15 The FDA is currently an example of that. And it's in some  
16 other documents from the National Academy of Science. But  
17 it's not a, quote, unquote, "law." The closest comes is San  
18 Francisco and the Board of Directors.

19 THE HEARING EXAMINER: There's nothing in the state  
20 as far as you know of?

21 THE WITNESS: Nothing in the state, no.

22 THE HEARING EXAMINER: Thank you, sir.

23 (Herein concludes the first excerpted  
24 portion of the transcript and begins the  
25 second excerpted portion of the

1 transcript.)

2  
3 JIM JOHANNESSEN, having been first duly  
4 sworn upon oath by the Hearing Examiner, testified as  
5 follows:

6  
7 THE HEARING EXAMINER: State your name and address  
8 for us, please.

9 THE WITNESS: My name is Jim Johannessen. Address  
10 is 701 Wilson Avenue, Bellingham, Washington 98225.

11 THE HEARING EXAMINER: Okay. Is he going to just  
12 testify, or do you have --

13 MR. PUDDICOMBE: Start.

14  
15 NARRATIVE TESTIMONY

16  
17 THE WITNESS: Yeah. I was asked to look into the  
18 coastal geologic, coastal geomorphic issues--whoops. Hold  
19 on, please--regarding the proposed Longbranch Shellfish  
20 case.

21 Very quickly, in terms of my experience, so you know if  
22 I'm qualified or not, I am a coastal geomorphologist. I run  
23 a business, Coastal Geologic Services, up in Bellingham, for  
24 the last 18 years. Trained through to a master's of science  
25 in geology, with a coastal geomorphic specialty. Licensed



1 engineer and geologist in Washington. Licensed geologist in  
2 Washington.

3 I did a bachelor of science in geology and oceanography  
4 at the University of Rhode Island. Prior to the 18 years of  
5 running my own firm, consulting in, pretty much exclusively,  
6 Puget Sound shorelines, I also worked at Ebasco  
7 Environmental, in Bellevue, which was also known as  
8 Envirosphere, which later became Foster Wheeler, and I  
9 believe it's changed again, again, as a geologist and  
10 coastal-processes person.

11 I've participated in writing portions in primarily one  
12 Environmental Impact Statement many years ago, working for  
13 another firm, called Norcall (phonetic), based in  
14 Bellingham. I've worked in all Puget Sound counties  
15 numerous times, on coastal-erosion issues, coastal planning,  
16 coastal restoration as well; designed beach nourishment  
17 projects in all of these Puget Sound counties; over 40 built  
18 projects; adding gravel, adding sand, adding logs, sometimes  
19 with vegetation, sometimes without.

20 I've worked with many larger firms as well, and ran many  
21 smaller projects and medium-sized projects. Worked on parks  
22 in four or five counties--state, local, and so on--on  
23 shorelines.

24 My firm has worked on about eight or so Shoreline Master  
25 Program updates, including Pierce County. We've also just

1           been working for the Corps of Engineers several times, and  
2           Puget Sound nearshore ecosystem-restoration projects; teamed  
3           with Department of Fisheries, looking at fisheries and  
4           wildlife, looking at restoration design. I'll stop with  
5           that, not to take any more time.

6           I think the proposal has probable impacts on sediment  
7           transport. I think it can cause suspension of sediment  
8           through the use of jets, the water jets. I feel that it  
9           will alter both the sediment resuspension -- It will have  
10          liquified sediments, even after -- immediately after harvest  
11          and for some considerable time thereafter that can be  
12          resuspended and transported through the drift cell.

13          I will give you some examples also. I feel -- I'll get  
14          back to those summary conclusions as well before I'm done.  
15          I feel there's a strong -- or let's say a significant lack  
16          of science for the proposal, as far as everything I've been  
17          able -- I poured through everything that has been made  
18          available to me. I've looked through other hearing records.  
19          I've looked through reference lists in the back of all these  
20          reports I've found.

21          There's many scientific studies, some of them  
22          peer-reviewed, from other areas -- that is, other countries,  
23          other parts of the United States, that are referred to in  
24          these documents. There are -- the ones that are done in  
25          Washington, in Puget Sound, are generally summary documents.

1 There's a lot of -- several firms that work for the  
2 shellfish industry extensively that have done numerous  
3 information reviews, proposed environmental impacts, quick  
4 summaries.

5 There's generally a great lack of original information  
6 within those studies. There's very few, and I'll get to  
7 those -- very few little bits of data that have been  
8 interjected, some of which -- most of which is unpublished,  
9 most of which is not fully presented, and most of which is  
10 very limited in quantity.

11 I feel that an Environmental Impact Statement would be  
12 important, which should be required for this development, as  
13 well as, I understand, many other developments that are  
14 potentially either in permitting or are soon to be in  
15 permitting.

16 I have prepared a very short memo, back in January.  
17 Didn't have extensive time or budget to do that. I've  
18 looked through additional materials since then. I'll be  
19 providing some additional opinions today.

20 One of the things I did was look through the literature.  
21 Golder & Associates has submitted a report for the  
22 proponent, 2001. Excuse me, 2011. I've read though that  
23 report.

24 Many of the conclusions in that report are based on an  
25 understanding of Puget Sound beaches in general; some

1 limited technical data from Puget Sound as a whole, not from  
2 this study area. They're based on a good set of sediment  
3 samples from this study area. And there's some description  
4 of the geology of the bluff and the beach sediments.

5 I agree with this background information that's  
6 presented in general. The geology, the sediments have been  
7 characterized well. What I don't agree with are some of the  
8 conclusions in the Golder study, that is one of the exhibits  
9 here. This is called "Assessment of Coastal Sediments and  
10 Shoreline Morphology Impacts, Proposed Longbranch Shellfish  
11 Farm," from February of this year.

12 There's a number of good bits of information in there.  
13 Then, as I said, there's some bits of information based on  
14 very limited data.

15 One of the references used in the Golder report is a  
16 field method for determining firmness of colonized sediment  
17 substrates. This is Exhibit 93 on the list that  
18 Ms. Hendricks put in. This is from New Brunswick, Canada,  
19 authors; Edmonton, Alberta, authors. I'm not going to bore  
20 you with the details.

21 I'm going to read you the first two sentences in the  
22 abstract, which is the summary of the paper. "Substrate  
23 firmness influences the erodibility, remobilization, and  
24 topographic expression of that substrate. Sediment  
25 distribution patterns, remobilization of sediment, and the

1 architecture of biogenic sedimentary structures are strongly  
2 affected by the firmness and cohesiveness of the sediment."

3 And this is one of the cases. So that's just their  
4 introductory statements. They've got some -- much more  
5 information referenced in here.

6 They developed a test of firmness for these type of --  
7 well, different, but vaguely similar, sandy sediments. To  
8 my knowledge, that test has been done once in Puget Sound,  
9 with 25 total samples, without replicates, without maps or  
10 figures or published data.

11 I've read through the ENVIRON report, where that comes  
12 from, which is another one of these exhibits, the 2009 one,  
13 and I just don't see that this is a scientific basis. That  
14 is cited in the Golder report, saying that that one study at  
15 ENVIRON, unpublished, is good evidence for the firmness does  
16 not change.

17 In contrast to that, we've got some direct observations  
18 by a Ph.D. oceanographer, Jeff Parsons, former professor  
19 from the University of Washington Oceanography Department.  
20 I'm not sure of the exhibit number. This is from the 2007  
21 Foss hearing records, 11/2/2007. This is dated from a court  
22 document, Page 162, and then the next few pages.

23 Mr. Parsons was asked -- he went to one of these harvest  
24 sites--I believe it was the Foss site--after harvest. Part  
25 of his testimony, he was asked, "And in terms of the

1 composition of the beach, were there any areas that seemed  
2 unusually hard or unusually soft?" The answer, "There was  
3 one area that was extremely soft on both of my visits, and  
4 that was about 100 to 150 feet off the beach, immediately in  
5 front of John McCormack's property."

6 He talks about how he knew where the property line was.  
7 A few paragraphs later, "It was extremely loose. Just  
8 walking over it, I sunk in about 6 or 10 inches, so covering  
9 -- well, enough to cover my feet and go up a few inches on  
10 my shin. And it was a very distinct area. It was also the  
11 same area that I was informed by Mr. John McCormack that  
12 that was the area that had been harvested earlier this  
13 year."

14 Just a little more from this same Page 164. Question:  
15 "My question was whether you developed an opinion regarding  
16 the cause of the soft area." Answer: "Oh, yes. Thank you.  
17 What I realized was that this was -- it looked to be  
18 liquified and looked liquified. It most likely related to  
19 the fact that there was a large quantity of water seeping  
20 out of the beach." And they asked him about what he thought  
21 caused it, and he's not certain. But he talked about  
22 fluidized sediment, on Page 165.

23 I've heard anecdotal information very similar, with very  
24 soft sediment that you sink into, from some of these other  
25 areas. I have not seen any data, like I mentioned, except

1 for the one study from ENVIRON, that actually look at that,  
2 at one site, on one day, after harvest. They looked at  
3 another site many months after harvest, which I don't  
4 believe is quite as representative.

5 From designing and implementing beach-nourishment  
6 projects, which is adding sediment to beaches -- we have one  
7 project I did in this past year, in Skagit County, where we  
8 added a sandy substrate, finer than many other projects in  
9 Puget Sound. For months afterwards, I would be walking on  
10 that beach, and I would be sinking into it.

11 So I'm thinking that's vaguely analogous to some of the  
12 fluidized areas that you had seen in some of those later  
13 slides that were shown just a minute ago, with people  
14 working in the hole, as they call it, I guess, with the  
15 water jets, sometimes sunk up to their waists, pursuing the  
16 geoducks, obviously, in sediment, which is then quickly put  
17 into the tidewaters and -- as the tide comes in, as shown in  
18 at least one or two of those photos.

19 There is a document by Megan Dethier, Amy Lietman, and  
20 others, Exhibit 38; went through a whole list of data gaps.  
21 I think a number of those are still potentially relevant and  
22 do not appear to be answered; again, going through all of  
23 this literature.

24 The Osborne -- excuse me, the Golder study of 2011 also  
25 states -- references some information from a technical

1 review--this is Exhibit 66--by Short & Walton. Then Ebasco,  
2 1992, working for DNR, "Transport and Fate of Suspended  
3 Sediment With Wild Harvest of Washington Geoduck." I do not  
4 believe this is directly applicable to the current proposal.  
5 This older study was subtitled "Wild Harvest," so in deep  
6 water by divers. Well, in water by divers, below the tide  
7 lines and lower in elevation than the current proposal.

8 Other studies cited in this report are from Atlantic  
9 Canada. There's one from Tokyo Bay, which I agree has some  
10 similarities, but it's very hard to extrapolate to a very  
11 different site.

12 I'm sorry. Back to the Short & Walton, Exhibit 66,  
13 quoting from Page 3-1. "First, there is no" -- and this is  
14 reviewing the EIS about wild harvests. "First, there is no  
15 quantitative discussion of the transport and fate of the  
16 initial plume produced by the harvest activity. As the EIS  
17 states, no studies have been conducted to actually follow  
18 the displaced material. This emphasizes the speculative  
19 nature of many of the numerical results presented."

20 THE HEARING EXAMINER: Before you continue, you  
21 were referring to "66." I'm assuming that's A66.

22 THE WITNESS: They are from the list.

23 MS. HENDRICKS: Ours. Exhibit A.

24 MR. PLAUCHÉ: Yeah.

25 THE WITNESS: That's correct. These numbers I



1 referred to are all from that same list so far. He  
2 continued directly on that same page, "There was also no  
3 attempt to quantify the likelihood of resuspension and  
4 further transport by waves and currents of unconsolidated  
5 sediment redeposited on the bottom after settling out of the  
6 plume."

7 They went on to do a brief field experiment on one day.  
8 They stated that they were trying to go measure currents and  
9 plume dispersal. In Section 4.3.3, Current Speed, "Measured  
10 current speeds during experiments were weak and variable,"  
11 meaning they were kind of not going anywhere in particular  
12 and flipping back and forth, "in many cases or below" -- "in  
13 many cases, at or below the nominal measurement threshold of  
14 the current meter," which I believe was 1/10 of a knot.  
15 Back to quoting, "The absolute accuracy of the measurements  
16 is therefore uncertain."

17 So they had a little bit of new data, but again, very  
18 limited time. It wasn't the current that they thought they  
19 were going to see. It was a different area than what we're  
20 looking at. We don't have currents measured. We don't have  
21 waves measured for this particular site.

22 The Golder report does estimate wave heights based on  
23 SeaTac Airport winds, which look at various wind data. It's  
24 my opinion the wind is a little bit less at SeaTac. It's in  
25 a bit of a valley, and it's not between islands, which tend

1 to channel winds.

2 Currents are cited from a commercial tide and current  
3 program in the Golder report, stating they might be up to  
4 about 25 knots. Again, there's no measurements. It's my  
5 opinion that, when waves strike the beach, it's not strong  
6 currents that are, by themselves, going to mobilize  
7 sediments and transport them. It's when waves strike the  
8 liquified sediments, following harvest in particular or  
9 immediately following tube removal.

10 There is minor accumulation in and around tubes, as  
11 stated in the Golder report. I don't think it's a  
12 significant impact. But again, when the tubes are removed,  
13 there's much more sediment for possible resuspension, along  
14 with the hydraulically fluidized sediments.

15 The net shore drift goes northward at this study area.  
16 Occasionally, the littoral drift, the sediment transport,  
17 goes southward. There is a large spit, in both directions,  
18 less than a mile distant, I believe, both ways. There is  
19 potential for altering sedimentation on those spits or in  
20 the area, particularly north of the farm, the proposed farm.

21 It's important to note the average density of the tubes  
22 -- which, I don't know if anybody has the perfect number for  
23 this, but if we're planting on a one-square-foot basis, it  
24 appears we have over 40,000 of these tubes per acre, just  
25 looking at the area of an acre. And they would be rotated

1 out. I understand harvest would be approximately every five  
2 years. So it's just a constant movement of the tubes and  
3 changing of the sediment. I understand, also, that harvest  
4 is heavier in the Thanksgiving-to-Christmas period, when  
5 waves are larger, which would be an increased chance of  
6 resuspension of sediment in these fluidized areas.

7 So I've given you some of my reasons. In the Golder  
8 report, I think he's looked at a very optimistic scenario,  
9 or the authors of that. They state, based on the study from  
10 Canada, Atlantic Canada, that the sediment transport near  
11 the bottom is, more often than not, offshore. But yet, when  
12 I trace back to one of those same papers, I realize that  
13 there's some quotes about sediment transport being onshore  
14 right at the bed and offshore just a little above the bed,  
15 and it's actually a complicated situation which we haven't  
16 measured here.

17 There's a lot of good work that could be done on these  
18 type of problem to identify: Where does the sediment go at  
19 -- both with control sites, as well as harvest sites, as  
20 well as sites with tubes? I've not seen anything to that  
21 kind of rigor that has been done.

22 Again, the Golder report tends to say, "Well, it's not  
23 likely that sediment will go to the upper beach. Fine  
24 sediments tend to go offshore," which I agree with in  
25 general. It doesn't mean sediments don't go temporarily on

1 the upper beach. Sediment is often resuspended. Tides come  
2 in, waves come in, and sediment moves.

3 Of course, it's not going to stay there forever, on a  
4 gravelly beach. Parts of the upper beach here are a coarse-  
5 sand beach with sand lance spawning where it's not gravelly.  
6 So there's more likelihood of sediment settling there,  
7 temporarily at least, than if it was strictly an all-gravel  
8 beach.

9 In looking at the proposal in context -- I think you had  
10 the air photo up on the board here, which showed --

11 MR. PUDDICOMBE: Are you ready for that?

12 THE WITNESS: Well, here. I can do that -- which  
13 shows the harvest area. And I've been confused. There's  
14 different leases, different timings, different proposals.  
15 But as I understand it, the harvest area that's being  
16 proposed is two and a half acres. I also understand there's  
17 another three, or as much as 10, acres immediately adjacent  
18 that has a lease at present time.

19 If we look at six or more acres -- if I need to pick a  
20 number and draw it in the sand, I would think, if we have  
21 six or more acres -- again, it's not a perfect number, but  
22 it's my best professional judgment, it's a significant  
23 portion of this beach and this drift cell -- that we would  
24 have probable significant impacts to sediment transport in  
25 this area.

1           So that's, of course, getting to cumulative impacts.  
2           And if we have more leases and we have other areas with  
3           higher density, obviously, that would be significantly  
4           cumulative impacts, in my opinion.

5           I wanted to just quickly go back to that ENVIRON July  
6           20, 2009 report for a moment. There's a summary table on  
7           Page 81, Table 5.2, which covers the meat of their  
8           discussion about sediment. There's really only a few pages  
9           in this entire, large report that talk about sediments. And  
10          this is primarily a fish-biology and an intertidal-organism  
11          paper. You have all of these habitats and species dependent  
12          on the geologic framework in which they will live.

13          Physical habitat condition pathway. This is sort of  
14          their hypotheses. Geomorphology changes above baseline,  
15          sediment transport, and dynamics. So that's what they're  
16          talking about.

17          And then, relative to on-site seed nursery operations,  
18          "Potential highly localized alteration in sediment transport  
19          movement around pools during placement possible. Likely  
20          immeasurable at project and actionary of scale."

21          And then talking about geoduck culture, grow-out  
22          harvest. "Potential localized effects from tubes placement,  
23          predator netting, and harvest possible. Net sediment  
24          accretion or erosion effects on the geomorphology at project  
25          or actionary of scales. Relative to environmental baseline

1 during course of culture cycle likely immeasurable."

2 So again, they're calling it "likely immeasurable," but  
3 they don't have the data to back that up. They've issued  
4 these warnings as potential impacts nonetheless, and they  
5 talk about potential periodic localized effects from tube  
6 placement, predator netting, and harvesting as well.

7 I would like to see something better than that before we  
8 are going to be basing decision after decision on these  
9 people who keep quoting themselves and quoting others and  
10 quoting the same reports over and over.

11 In addition, some of the geologic quotes -- excuse me,  
12 references, in this environmental report are fairly obscure,  
13 fairly out of date. Their use of terminology is not  
14 correct. They're missing a lot of good recent papers that  
15 are more applicable.

16 One quick quote from one of the Golder references, this  
17 is "The Journal of Coastal Research," July 2007, highly  
18 regarded peer-reviewed document. Again, from the  
19 introduction. This is a study from Japan, "Hydrodynamics  
20 and Associated Morphological Variations On An Estuarine  
21 Intertidal Sand Flat."

22 And from the introduction, "Even when slight erosion  
23 occurs on tidal flats, it may have significant impact on the  
24 resident benthos." And there's a citation that I can't  
25 pronounce. "Understanding the use of hydrodynamics and

1 associated morphological processes on intertidal flats and  
2 wetlands is a prerequisite for the development of conceptual  
3 and quantitative models that are essential to allow  
4 effective management of the intertidal area."

5 So, again, we don't have -- why don't I stop there, see  
6 if there's any questions.

7 MS. HENDRICKS: I have a couple questions.

8  
9 DIRECT EXAMINATION

10 BY MS. HENDRICKS:

11 Q You explained the term "net shore drift." Does the  
12 sediment ever move along the shore in the opposite  
13 direction?

14 A Yes. The "net shore drift" is a phrase that was coined by  
15 Dr. Maurice Schwartz in the early '90s, a professor I  
16 studied under, and that refers to the total sediment  
17 movement. So the net movement is northward here over many  
18 years of beach sediments. But that doesn't mean, on  
19 certain days, it goes southward. The net balance is  
20 clearly northward, based on the evidence published, and as  
21 well as I've seen. So there's clearly potential to move  
22 sediment down this direction as well, towards the spit and  
23 the bay and the stream and the habitat down there.

24 Q Are sand and gravel spits important for creating habitats,  
25 in your opinion?

1 A Sand and gravel spits create quiet water habitats behind  
2 them. Many of these have salt marsh present as well. So  
3 these are areas that, as I understand it, the people  
4 studying salmon or juvenile chinook and other juvenile  
5 salmon consider those habitats very important.

6 Q Might the removal or extermination of shellfish that live  
7 near the surface of the sediment or other debris alter the  
8 sediment transport at the proposed site, or even adjacent  
9 to it?

10 A And I feel that the removal of shellfish as well as some of  
11 the materials--as I mentioned, the plastics used--  
12 definitely could alter sediment transport, temporary  
13 effects which would then be released when the materials are  
14 removed from the substrate.

15 Q So I guess I just want to reiterate: Your opinion, as far  
16 as probable or significant impacts?

17 A Yes. I think that -- maybe just to back up one step before  
18 I can reiterate that, I've worked a lot in the planning  
19 restoration projects, prioritizing them, prioritizing  
20 conservation projects. We've done studies throughout all  
21 of King County, Skagit, San Juan, Bainbridge Island, and  
22 parts of Mason County.

23 Conserving habitat is extremely cheap compared to  
24 restoring habitat. That would be my main point. Keeping  
25 something healthy -- and I'm not going to talk about fish



1 or shellfish in detail here, but keeping the system healthy  
2 and in place and not negatively affecting other systems  
3 adjacent is the most cost-effective way of conserving or,  
4 as a net, trying to improve salmon and other organisms' --  
5 their habitats in the Sound.

6 I mean, the Corps of Engineers, the Department of Fish  
7 and Wildlife is expending millions of dollars trying to do  
8 restoration, writing these documents like "Management  
9 Measures For Protecting and Restoring the Puget Sound  
10 Nearshore," and they haven't really done much on-the-ground  
11 work yet. They haven't even spent money on projects, where  
12 it gets really expensive.

13 So getting back to the question, I feel that the  
14 cumulative impact of approximately six or so acres on this  
15 particular beach area for geoduck harvest, as proposed,  
16 would have probable significant negative impacts, in terms  
17 of changing the sediment-transport dynamics and could  
18 affect habitats down drift, primarily to the north, but  
19 possibly to the south.

20 Q Do you feel there are tests that can be done in an EIS that  
21 would give us more information to make better decisions, as  
22 far as the County decision-makers?

23 A There are many things that could be done in an  
24 Environmental Impact Statement, and if one is done, for  
25 whatever reason, I would strongly hope that it contains new

1 data, original work. One of the weaknesses of EISes is  
2 that they restate things very frequently, in order to dot  
3 all their I's and cross all their T's.

4 What would be very productive, I think, would be doing  
5 sediment-transport studies at control sites, as well as at  
6 harvest sites, and doing them repeatedly, not just for one  
7 quick visit while the scientist is standing next to the  
8 harvester for a short period of time, measuring as best he  
9 can in that short period of time, with just that time.

10 That would be in terms of sediment cover and grain  
11 size. Sorry, topography and grain size changes before or  
12 after harvest, as well as tracking any plumes or turbidity  
13 that is in the water, especially when the tide rises after  
14 harvest areas and during storms or after storms and periods  
15 following harvest.

16 Those would be some of the main points I would make,  
17 and I'm sure -- I haven't really thought that one through  
18 completely. But I'm sure there's some other productive  
19 means of quantifying if some of the finer-grain sediments  
20 are getting off-site, for example. Some of the evidence  
21 cited in ENVIRON in 2009 has some fines being lost in the  
22 harvest area while another site does not. So there's some  
23 contradictory information based on the limited data to  
24 date.

25 Q Did you have a PowerPoint or --

1 A I had a brief PowerPoint, yes; only about seven or eight  
2 slides. It's something I put together in the last week  
3 without much time or scientific rigor, I will admit. I  
4 relied on the same sets of aerial photos as are in the  
5 Golder reports, which is those that are quick and easily  
6 available on Google Earth. We've done extensive spit-  
7 dynamics studies and so on from purchased air photos with  
8 very strict spacial controls, much more so than we can do  
9 with a free program like Google Earth.

10 But just quickly, looking at the Foss drift cell on  
11 the west side of the peninsula, west of this site, which is  
12 an active site which had had a little bit of study, but not  
13 along the area down drift of the site. Go ahead, please.

14 MS. STOCK: Just one minute before we begin.  
15 Examiner Causseaux, I just kind of had the same set of  
16 questions that I did before the last PowerPoint.

17 But are these -- you said you put this together in the  
18 last week. Is this slide slow included in Appellant's  
19 exhibits?

20 THE WITNESS: It is not.

21 MS. HENDRICKS: No.

22 THE HEARING EXAMINER: Do you want to look at it  
23 first?

24 MS. STOCK: We would like to review the slides  
25 before we proceed.

1 THE HEARING EXAMINER: Okay. Let's go off the  
2 record, then.

3 (Recess taken from 2:59 p.m. to 3:02 p.m.)

4 MS. STOCK: I just wanted to let you know, Examiner  
5 Causseaux, we've requested a copy of the presentation, just  
6 because it's not included in the Appellant's exhibits, and  
7 Appellants have agreed to provide us with a copy. We'd like  
8 to get a copy of the presentation by the end of the day  
9 today.

10 THE HEARING EXAMINER: You mean the slides?

11 MS. STOCK: Yes. In addition to that, we requested  
12 earlier, during Dr. Gilbert's testimony, that we receive a  
13 copy of the Essco Safety Check report, which Appellants  
14 agreed to provide. And we'd also like that by the end of  
15 the day today as well.

16 MS. HENDRICKS: We have experts in town. We're not  
17 planning to be back until late tonight. I'd have to ask  
18 them. We're certainly willing to give it, but I think the  
19 end of the day today is pretty fast. I can't speak for  
20 them, so, I guess, let them speak for themselves. We have a  
21 lot to do tonight, to meet with people, our experts.

22 THE HEARING EXAMINER: How long does it take to get  
23 a hard copy of the presentation here?

24 THE WITNESS: Oh, there's a PDF file on it as well.

25 MS. STOCK: We'd be just fine to receive a copy of

1 both of those items by email.

2 MS. HENDRICKS: Oh, okay. That would be fine.

3 THE HEARING EXAMINER: Okay. But I do want to get  
4 a hard copy of this for the file. So what's our next  
5 exhibit number?

6 THE CLERK: 5.

7 THE HEARING EXAMINER: I'm going to mark the hard  
8 copy here of this presentation as Exhibit 5, and you can get  
9 me that later.

10 MS. STOCK: Thank you.

11 THE HEARING EXAMINER: Are we ready, then?

12 THE WITNESS: Yes. This is the final part of what  
13 I was planning on going over today. Again, this is strictly  
14 using Google Earth images. These are not carefully  
15 rectified. We cannot do careful measurements. But I  
16 believe there's changes that are large enough to see from  
17 these kind of viewpoints, looking at vertical photos from  
18 what's available quickly here.

19 I think a much more thorough study should be done. Then  
20 I would add this to the list, of doing a geomorphic  
21 shore-form change analysis at and down drift of harvest  
22 sites, again, with control sites that are as similar as  
23 possible, without harvest.

24 The Foss site, I know, has been active since roughly  
25 2000, as I understand it. The harvest area, or at least the

1 hand -- excuse me. It's kind of hard to see on these  
2 photos, but there's algae-covered nets and/or tubes here.  
3 There's some up here. There's a bunch of fields of  
4 geoducks, as it appears on the photos, planted here as well.  
5 So this is west of the site some five-plus miles and north  
6 very slightly.

7 I'll show one quick picture from there, a few quick  
8 pictures from this residential area just a little bit north  
9 and down drift. Again, the southerly winds are driving the  
10 net shore drift. And then we'll show a few side-by-side  
11 images from this spit area, a little bit further north. Go  
12 ahead, please.

13 This is the 2006 Department of Ecology oblique air  
14 photo, different source. As I understand the Foss site is,  
15 it's from August 11, so the tide is fairly low. We can see  
16 the whole intertidal with some activity here, and perhaps  
17 some other plantings we can't see. Go ahead, please.

18 And then going north to that first spot, about halfway  
19 up, the Ecology oblique photos that are available, that are  
20 any good, start in 1992. Mind you, there's many more  
21 vertical air photos that can be purchased from various  
22 archives, that I have not done.

23 So we see an area where there's lots of sand, apparently  
24 in motion here, in transport. This is the same area, a  
25 little closer in, in 2000. So a number of these bars have

1 changed position. The high areas have shifted around. This  
2 appears to have extended roughly the same area, but I don't  
3 know if it's further out, further in, if there's more bars  
4 present at certain elevations, less bars. It just appears  
5 very different from this kind of oblique observation. It's  
6 hard to measure from these. Just, these are the best  
7 illustrative photos. Same site. Go ahead, please.

8 That's that same 2000 photo, and then we have 2006, or  
9 the most-recent Ecology photos. And again, you can see a  
10 number of gross changes to the bars. I'm not saying this is  
11 necessarily and conclusively caused by the site. Sand bars  
12 do move. These features are intertidal. They are stable;  
13 they're dynamic.

14 When I did a comparison around these few bays and inlets  
15 in this general area, using these same sets of photos, I did  
16 not see this type and this degree of change. It's not  
17 scientific. It's not statistical. I'm admitting that right  
18 up front. I'm sure I can be attacked on this by lots of  
19 scientists. This is just a quick look-through. And I saw  
20 more change in this area than the other areas, particularly  
21 the next northern site. But go ahead, please.

22 So that's that same middle site from the Google Earth  
23 verticals. 1990 is the oldest ones available there. And  
24 again, the tides are different heights. This is far from  
25 impacts. But we can still see some gross changes that are

1 more than I expect from a low to moderate wave-energy  
2 environment on a Puget Sound basis. We've done lots of  
3 shore-change studies, and we don't usually see this much  
4 intertidal and upper back-shore change.

5 So 1990, we were pre-harvest. 2002, we presume we may  
6 or may not be into the harvest. I'm not sure it was planted  
7 in 2000. Again, I don't know all the details. But as we  
8 start to go forward in the photos, by 2003 -- and then go  
9 ahead to the next, please -- 2006.

10 I showed you a different view of this from this same  
11 summer. And then, again, bars are looking different, and  
12 then quite different again through to 2009, even May to  
13 September. Again, this is speculative, but I am seeing a  
14 fair amount of change here.

15 Let's go to the northern area, please; try to finish up  
16 Google Earth images. This is the northern of the three  
17 areas. There's a bulkhead here which shows up fairly well.  
18 Well, relatively well in these images here. So way before  
19 harvest, 1990, at a low tide. It's a pretty lousy photo.  
20 These beaches are often -- just kind of get whited out. But  
21 at least we can see there's a relatively uniform spit up on  
22 the north.

23 So we're in 2002. Not much change, but a little bit of  
24 accretion right there by 2003. Minor change. These are  
25 very little change, I think, through this period. You can



1 see this little hook spit, and the area behind is very  
2 similar. It might even be very similar here. Again, this  
3 part might be just washed out. These are old DNR photos.  
4 They're not terribly good.

5 Same area. We're into March from 2005 forward here, I  
6 think, on the last image. So 2006, we see this spit start  
7 to grow out further. These are all the same scale, to the  
8 best Google can do. And we start to see more intertidal  
9 deposition here and here. And then there's -- this one has  
10 grown further, and then there's this little, incipient spit  
11 here as well.

12 2009, this one is getting larger. This one appears to  
13 be extending slightly. Some change here. It's hard to say  
14 if it's changed significantly or not. Most recently  
15 available photo, September '09. This spit has gotten  
16 considerably larger, and then it's all filled in with those  
17 spits merging together.

18 So again, this is not rocket science. I'm just trying  
19 to get a quick look, and I would much rather see a more  
20 carefully done study on a much broader area. But this was  
21 what was readily available, given the time and budget.

22 That's all for the slides.

23 MS. HENDRICKS: Is that all?

24 THE WITNESS: That's all I have, unless you have  
25 more questions.

1 MS. HENDRICKS: No more questions from me. Thank  
2 you.

3 THE HEARING EXAMINER: Thank you. Ms. Kisielius,  
4 Mr. Plauché, any questions?

5 MS. STOCK: Actually, Ms. Stock. Yes.

6 THE HEARING EXAMINER: Oh, I'm sorry.

7 MS. STOCK: We switched.

8 THE HEARING EXAMINER: You switched. You threw me  
9 off there.

10 MS. STOCK: We tricked you. I just wanted to be  
11 able to see the presentations.

12

13 CROSS-EXAMINATION

14 BY MS. STOCK:

15 Q So hello, Mr. Johannessen. My name is Amanda Stock. I  
16 just have a few questions for you regarding your  
17 presentation and your report.

18 A Uh-huh.

19 Q So I'd like to start with a few questions on part of your  
20 testimony today. You talked about a hearing that took  
21 place for the Foss farm and some statements made by Jeff  
22 Parsons?

23 A Yes.

24 Q And these statements were regarding the Foss farm. Have  
25 you ever been to the Foss farm?

1 A I have not been to the Foss farm.

2 Q Okay. And did you review the entirety of the discussion,  
3 in the transcript for that Foss-farm proceeding, that  
4 discussed the issues to which Jeff Parsons testified?

5 A I read the entire Parsons testimony. I haven't read the  
6 entire testimony by everybody.

7 Q So you reviewed the testimony of Jeff Parsons but not of  
8 other --

9 A Yes. I looked at some of them. I can't tell you exactly  
10 how much, but, no, I did not read the entire thing.

11 Q You said your opinion regarding the issues that Jeff  
12 Parsons testified to is based on anecdotal reports of  
13 observations of geoduck harvests?

14 A I believe his testimony was direct observations by himself,  
15 and I have also heard other anecdotal -- or other  
16 anecdotal.

17 Q And I'm asking about your testimony specifically, not that  
18 of Jeff Parsons. But your testimony is based on anecdotal  
19 observations of others?

20 A My testimony based on the lack of firmness only was based  
21 on the Parsons transcript, as well as other anecdotal.

22 Q Thank you. And have you ever visited a geoduck-farm site?

23 A I have not. I've seen lots of photos, but, no, I have not  
24 visited one. And I'm sure that would be educational.

25 Q And you sort of answered this from your last question, but

1           you've also never seen a geoduck harvest?

2   A       Not in person, no, but again, just lots of photos.

3   Q       And you did mention in the report that you prepared for  
4           this proceeding you conducted a site visit to the  
5           Longbranch site, correct?

6   A       That's correct.

7   Q       And you stated in your report that your site visit occurred  
8           on what was predicted to be an approximately +2.4 tide?

9   A       Correct. Yes. And I was wearing boots so I could get  
10          lower, but yes.

11   Q       And you stated that this was the lowest daytime low tide  
12          during the work conducted for this project in January of  
13          2011?

14   A       Yes. Which was a fairly brief period when I worked on  
15          this. I'm -- I imagine, on the 1st or the 2nd, maybe there  
16          was a lower tide, but it was the lowest available in the  
17          window I had to work in.

18   Q       And the site itself is--I believe you mentioned this in  
19          your report--proposed to be a -3 to +2 tideland elevation?

20   A       That's how I understand it, yes.

21   Q       So when you visited the site, the actual area proposed for  
22          the farm was entirely underwater, correct?

23   A       Correct. And as I said briefly there, and I'll explain  
24          further, I was walking into the water and looking at it and  
25          digging, shovel, and trying to see what the sediments were.

1 I've reviewed the Golder sediment sampling, which was  
2 of enough quantity to get a good idea of what's in there.

3 Q And when you went out and visited the site, you didn't take  
4 any site-specific wind or wave measurements, did you?

5 A I did not. It was fairly calm the one day I was there.

6 Q I'd like to go back to revisit one of the opinions that you  
7 stated regarding the proposed farm, near the end of your  
8 testimony. I'll attempt to rephrase, but please feel free  
9 to clarify if I do an insufficient job.

10 You stated that looking at the Aquaduck farm, plus the  
11 proposed Longbranch farm, based on the potential cumulative  
12 impacts of both of those proposals put together, you felt  
13 that the proposal would have adverse impacts?

14 A Yes.

15 Q And was that based on -- that's based on the cumulative  
16 analysis, looking at the entirety of the farms, correct?

17 A Yes. I mean, I talk about the processes as I understand  
18 them. It's very hard to make a threshold determination on  
19 something like this when there's so many variables. I said  
20 at the six-acre level is my best professional judgment.  
21 Maybe I could have said five- to seven-acre, because it's,  
22 as I said, a little bit fuzzy.

23 But with enough disturbance to a fine-sand intertidal  
24 and shallow subtidal, we expect to see some changes.  
25 Exactly how far they go, exactly what the level of acreage

1 and disturbance is not easy to say.

2 Q Okay. And I'd like to turn to the report that you  
3 prepared, and I'll hand you --

4 A I've got a copy here.

5 Q I've actually got one with the section highlighted.

6 A Okay.

7 Q If you could just take a look at it and confirm that this  
8 is the report that you prepared.

9 A This definitely looks like the same report I prepared, yes.

10 Q Okay. And can you please read the highlighted section on  
11 Page 3 of your report there out loud?

12 A Sure. "After reviewing the above-referenced information  
13 and after performing the site visit, it is my general  
14 professional opinion that the proposed farming and harvest  
15 of geoducks at the density outlined presents a moderate  
16 risk of negatively impacting physical beach habitats within  
17 the farming area and also off-site."

18 Q Thank you. And then just a few questions regarding your  
19 PowerPoint.

20 A Uh-huh.

21 Q I just want to clarify and confirm some statements you  
22 made. First off, you stated that Foss farm, that area, was  
23 a low- to moderate-energy site, correct?

24 A I did state that. I believe I went on to say "in a Puget  
25 Sound-wide context." If you're only talking about this

1 fairly far-southern Puget Sound region, I've heard it  
2 called high-energy. I don't -- as a person working  
3 Sound-wide and many of us planning Sound-wide, we try not  
4 to regionalize everything. But yes, that's what I said.

5 Q Okay. And you said the analysis wasn't done with any  
6 scientific rigor, correct?

7 A Not the kind it should have, correct. It's based on a  
8 visual observation of the shore forms and land forms from  
9 the air photos, which I believe has merit. It's very good  
10 qualitative geomorphic starting points. It's where the  
11 detailed work would go after that which could be up for  
12 discussion.

13 Q And you stated that the changes that you observed in  
14 reviewing those aerial images were not necessarily and  
15 conclusively caused by the Foss farm, correct?

16 A That's correct.

17 Q You said your analysis was neither scientific nor  
18 statistical?

19 A That's correct. It's hard to do statistics, I must admit,  
20 on these type of projects. We've tried them, and consulted  
21 with Ph.D.'s and leaders around the country, and geomorphic  
22 studies of changing sediment's character, which we've done  
23 using statistics, are not easily done or not easy to  
24 present.

25 But shore-change studies have a long history,

1 well-documented methods. If this were done more carefully,  
2 it's my suspicion that there's changes due to that site.  
3 But as I said, I am not at all certain about that.

4 Q Thank you. And you also stated that your analysis was  
5 speculative, correct?

6 A Correct. I might have said that. I've tried to explain it  
7 as best I could. It's, again, based on the right training,  
8 the right land forms, without much budget or time.

9 Q Okay. And do you know when the Foss farm was first  
10 planted?

11 A I do not know the detailed history. As I've read from the  
12 record, that operation started in 2000. I'm not certain if  
13 that's correct.

14 Q And do you know when the Foss farm was first harvested?

15 A Well, I would suspect it was roughly five years later, but  
16 I do not know. And what I was trying to say while looking  
17 at those photos, there appeared to be more change in the  
18 late part of the 2000-2010 decade as opposed to the earlier  
19 parts, if that wasn't clear.

20 MS. STOCK: Okay. Thank you. I have no further  
21 questions.

22 THE HEARING EXAMINER: Ms. Guernsey?

23 MS. GUERNSEY: None.

24 THE HEARING EXAMINER: Ms. Hendricks?

25



REDIRECT EXAMINATION

BY MS. HENDRICKS:

Q Is it correct that the report that you initially did was turned in by the end of January for a February 1st due date?

A That's correct. It was submitted January 31st, yes.

Q Have you done more work and analysis in this last six weeks since you submitted the initial report?

A I have done more work and analysis since then. I've probably done more than 50 percent of the work on this project since that was submitted, due to initial timing issues, scheduling, and not having all the references and so on, yes.

Q So does that have a factor on -- your opinion originally was moderate, and you have changed that opinion to --

A Yes. My opinion has changed somewhat. Not completely, but somewhat, to understand that there are more likely impacts than what I presented in the January 31st report.

Q Ms. Stock referred to the word "speculative." Are you an attorney?

A I am not an attorney.

Q Does that word have a different meaning to a scientist than it would to an attorney, as you're discussing --

A Well, I'm not exactly sure what it means to an attorney, but yes, it has a connotation that you have very low

1 confidence, is how I interpret it, or that you have very  
2 little information to base it on. I guess maybe the  
3 latter.

4 I did try to qualify these Google Earth images, work  
5 being fairly quick and dirty, if I can use another term  
6 that everybody knows, and not conclusive. But at the same  
7 time, big land forms visible in air photos, same kind I've  
8 been looking at for 25 years or 30 years -- I feel there's  
9 still some merit in preliminary conclusions drawn on them  
10 and raising questions that should be answered with a better  
11 study.

12 Q So let me make sure I understand. There are parts of your  
13 testimony that are inconclusive, but you still -- your  
14 personal opinion is that there are still probable and  
15 significant impacts, even though there may be parts of it  
16 that are still inconclusive, that need more data. Or say  
17 it however a scientist says it.

18 A That is correct. The last part of what I showed, the  
19 Google Earth, as we already discussed, is not the most  
20 rigorous analysis. Irregardless of that, based on the  
21 other assessments of the site that I have made and assessed  
22 what others have written, it is my opinion that there are  
23 likely negative impacts to sediment transport and  
24 deposition and that they would become, most probably,  
25 significant given a cumulative acreage on the order of

1 five, six, or seven acres on this particular site.

2 MS. HENDRICKS: That's all I have.

3 THE HEARING EXAMINER: Ms. Stock, do you have  
4 anything further?

5 MS. STOCK: Yes. I do have two additional  
6 questions.

7  
8 RE-CROSS-EXAMINATION

9 BY MS. STOCK:

10 Q The first is: Are you familiar with the large Nisqually  
11 earthquake that took place in the Puget Sound area within  
12 the last 10 years?

13 A Yes. I believe, in 2001, yes.

14 Q Okay. And in your professional opinion, would that  
15 earthquake have had any impacts on the geomorphology of the  
16 shoreline areas of this region of Puget Sound?

17 A The Nisqually earthquake may have had some localized -- or  
18 some impacts to the geomorphology. That's correct. I know  
19 there was certain wetland areas, certain areas along some  
20 river channels where the sediments were saturated, where  
21 there was some bubbling up and some other odd things that  
22 occurred during and after the earthquake.

23 To my knowledge, I don't know that there's been any  
24 documented change in these spits or these land forms based  
25 on the earthquake. I might have missed something. I don't

1 know everything. But I have not heard that used as a  
2 shoreline-change event in Puget Sound, in a broad sense.

3 Q How about feeder bluffs?

4 A Feeder bluffs being bluffs that input sediment to the  
5 beach, I'm very familiar with it. We've developed a  
6 mapping protocol for that for Washington state. The  
7 earthquake at Nisqually may have caused -- I know it did  
8 cause some amount of landslides. That's correct.

9 I don't feel they were widespread in nature. They  
10 definitely did cause some in southern Puget Sound, closer  
11 to the Nisqually delta. Again, the period I was looking at  
12 and seeing more changes was in the late 2000s, not the  
13 early to mid 2000s. Again, that was already explained.

14 Q I know I said I had two questions, but, actually, I had  
15 three. And so just my final question. You stated that  
16 your professional opinion had changed since drafting your  
17 report and your testimony at hearing today, based on some  
18 additional work that you did between the beginning of  
19 February and today's date, correct?

20 A Yes.

21 Q Okay. And you mentioned that, and -- let's see. So in  
22 your report, you provided a list of documents that you  
23 reviewed, gave a description of your site visit, and a site  
24 characterization, correct?

25 A Correct.

1 Q You mentioned that, during the period between drafting your  
2 report and this hearing today, you reviewed Dr. Phil  
3 Osborne's report on the geomorphology of this site,  
4 correct?

5 A That's correct.

6 Q And then, in addition, you reviewed studies and literature  
7 that Dr. Osborne cited in his report?

8 A That's correct. As well as other studies in the record,  
9 but especially many of his, yes.

10 Q Okay. In addition to the -- can you just briefly describe,  
11 in addition to Dr. Osborne's reports and cited studies,  
12 what else you reviewed between the time of drafting your  
13 report and your testimony today?

14 A Well, I've mentioned a number of them already this  
15 afternoon. I tracked down as many as I could or, also,  
16 that I felt were particularly relevant from Osborne's  
17 Golder Associates study.

18 I looked at other reports by, again, Gingress and  
19 Pemberton. I mentioned one of them today. I looked  
20 briefly at the Supplemental Environmental Impact Statement  
21 that was done, I believe, around 2001. I had a list almost  
22 a page long in my January 31 report. I looked at a few  
23 other studies such as this one, this -- some of these Puget  
24 Sound-wide studies. "Beaches And Bluffs of Puget Sound,"  
25 this "Management Measures." That's all I can remember

1 specifically.

2 MS. STOCK: Thank you.

3 MS. HENDRICKS: Thank you.

4 VOIR DIRE EXAMINATION

5 BY THE HEARING EXAMINER:

6 Q I just had a couple of questions I wanted to ask. This is  
7 more for clarification, I think, but I'm looking at Page 4  
8 of your report, and you're talking about -- I think it's  
9 the second paragraph. It would be the first full paragraph  
10 there.

11 You're talking about -- well, just "the use of PVC  
12 tube and netting, although not used continuously, would  
13 likely change local sediment transportation or transport  
14 processes." And, "Tubes would be placed at the density of  
15 approximately one every square foot and would dampen the  
16 wave energy around them and would likely lead to increased  
17 sedimentation."

18 And then the next sentence, "This would cause a  
19 decrease in sediment transport beyond the site." If the  
20 tubes produce increased sedimentation, then how would that  
21 decrease the sediment transport?

22 A Good question. That's not as well stated as it could have  
23 been, I agree. What I'm meaning here is that, around the  
24 tubes would -- the tubes would cause a slight decrease in  
25 wave energy, along with whatever netting may or may not be

1 used, which would likely cause a localized increased  
2 sedimentation. So sediment that's coming from elsewhere  
3 with waves would likely tend to settle, temporarily at  
4 least, around the tubes.

5 And then, the next sentence, "This would lead to a  
6 decrease in sediment transport beyond the site," meaning  
7 is, it's stopping here (indicating), it's not getting down  
8 here. So localized transport deposition around the tubes,  
9 which would lead to less sediment moving beyond the site  
10 until the tubes are removed, which I think we talked about  
11 a little bit earlier, and then that sediment transport  
12 would perhaps more quickly move on to the north, or  
13 whichever direction.

14 Q So when the tubes are removed, then you're looking at your  
15 photographs from your previous presentation showing  
16 increased sedimentation to the north?

17 A Off-site.

18 Q Off-site. So this is a temporary situation, then?

19 A Right.

20 Q Okay. Then, on your next paragraph down, or your next  
21 section--it's "Lack of Physical Monitoring"--you talk about  
22 the Sea Grant conducting studies, and then you seem to  
23 indicate that there's a substantial lack of data on  
24 sediment accretion, erosion, and transport, as well as  
25 changes to beach habitats prior to and during tideland and

1           subtidal aquaculture uses. Or use.

2           And I guess my question here is: Based on your  
3           testimony and this last statement here, are you pretty much  
4           in the same, I guess, ballpark as Dr. Gilbert, then, in  
5           saying this is more of a precautionary type of an approach  
6           to the process, or are you beyond the precautionary and are  
7           you stating that this is an actual impact?

8       A    I don't think I'm relying -- I mean, the precautionary  
9           principle makes lots of sense, but I do not -- I don't want  
10          to say I'm relying on that. I think there's enough  
11          knowledge of sediment transport, as compared to the toxic  
12          effects -- potential toxic effects of PVC -- I think  
13          there's enough knowledge of the sediment transport to be  
14          more conclusive than the uncertainties that Dr. Gilbert  
15          admitted with the dangers of PVC in the environment.

16                   THE HEARING EXAMINER: Thank you, sir.

17  
18                                   (Herein concludes the excerpted portions of  
19                                   the transcript.)  
20  
21  
22  
23  
24  
25



1 CERTIFICATE

2 STATE OF WASHINGTON )  
3 COUNTY OF KING )

4 I, LINDA M. GROTEFENDT, a Certified Shorthand  
5 Reporter and Notary Public in and for King County,  
6 Washington, do hereby certify that I reported in machine  
7 shorthand the above hearing; that the foregoing transcript  
8 was prepared under my personal supervision and constitutes  
9 a true record of the above hearing.

10 I further certify that I am not an attorney or  
11 counsel of any parties, nor a relative or employee of any  
12 attorney or counsel connected with the action, nor  
13 financially interested in the action.

14 WITNESS my hand and seal in Renton, County of  
15 King, State of Washington, this 30th day of March, 2011.

16  
17  
18  
19  
20 \_\_\_\_\_  
21 Notary public in and for the  
22 State of Washington, residing  
at Renton.

23 My commission expires 1-2-2012.  
24  
25