

1 hearsay objection to this. This is even more egregious.  
2 This is a port-generated document. And this is not the  
3 witness to bring this in for the truth of the matter  
4 asserted.

5 MR. PEARCE: I can lay a foundation. But it's  
6 the same type of document as 1118.

7 MS. COTTINGHAM: This is a draft memorandum,  
8 so do you want to make your arguments?

9 Q. (Continuing By Mr. Pearce): Are you familiar with this  
10 document, Dr. Stubblefield?

11 A. Yes, I have seen this document, that's correct.

12 Q. Is this the same type of document as in 1118?

13 MR. STOCK: Object, vague.

14 Q. Is this a range-finding WERS study?

15 A. This document presents the results of some range-finding  
16 toxicity tests that were conducted, that's correct.

17 Q. Is this the data draft or --

18 A. No, the data are actually laboratory bench data sheets,  
19 which is the kind of things that, frankly, I would want  
20 to see, as opposed to a summary report. It is the true  
21 basis of what was generated as opposed to a report that  
22 may or may not adequately reflect all of the data that  
23 were gathered during the studies.

24 MR. STOCK: Based upon that testimony, Your  
25 Honor, it's just getting more attenuated. It's actually

**AR 056666**

1 now double hearsay, where attached to this port  
2 memorandum is lab results. No one is hear from the lab  
3 to cross examine. Dr. Stubblefield can't be cross  
4 examined on the lab results. He can't be cross examined  
5 on the port memorandum. It is classic hearsay. And in  
6 terms of the indicia of trustworthiness, it hasn't been  
7 established. I don't see how the board can rely --

8 MS. COTTINGHAM: I am going to allow this in  
9 for background only because of the draft nature. If it  
10 were a more formal report that somebody might rely on, I  
11 might let it in, but --

12 MR. PEARCE: Can I ask him whether he would  
13 rely on the data?

14 MR. STOCK: On draft reports.

15 MR. POULIN: Your Honor, I would further note  
16 that there still has been no foundation laid as to this  
17 witness's familiarity with this document.

18 MR. PEARCE: I would be happy to lay that  
19 foundation. I think he testified he was familiar with  
20 the document, that it's a range-finding WERS study, and  
21 that this is the kind of laboratory data that he  
22 typically relies on in his professional work.

23 MS. COTTINGHAM: Why don't you lay the  
24 foundation better.

25 Q. (Continuing By Mr. Pearce): Are you familiar with this

**AR 056667**

1 report?

2 A. I have seen and read this report, yes.

3 Q. Is this the type of laboratory data that you typically  
4 rely on in forming your professional opinions?

5 A. Yes, it is.

6 (Board conferring)

7 MR. STOCK: ACC will continue to assert the  
8 hearsay objection. It's double, triple hearsay and their  
9 is an indicia of trustworthiness required by the board's  
10 own rules.

11 MS. COTTINGHAM: I am going to grant the motion  
12 to exclude this for hearsay purposes. It can be only for  
13 background, which is what the matrix shows it for, but  
14 not for the truth of the matter asserted.

15 MR. PEARCE: Thank you, Your Honor.

16 Exhibit 649. I would note that this memorandum is  
17 an ACC exhibit that's been stipulated to by ACC.

18 Q. Have you reviewed this memorandum from Parametrix, Dr.  
19 Stubblefield?

20 A. I have seen this document, yes.

21 Q. Does it report the findings of the whole effluent -- of  
22 the WER ratio range-finding study?

23 A. It does, or at least it presents the range of data that  
24 was obtained, correct.

25 Q. What is your opinion about the results or indications

**AR 056668**

1 from the WERS screening study at the port?

2 A. My opinion is that the water effect ratios that had been  
3 generated here and are presented in this memo are  
4 slightly higher than but are not surprising in terms of  
5 what I've seen previously at other sites and other waters  
6 with regard to the types of water effect ratios you would  
7 expect to see for copper.

8 Q. And what is the range that's indicated for a water  
9 effects ratio?

10 A. This memo reports that it's 7 to 16.

11 Q. Is that consistent with water effect ratios for copper  
12 reported in scientific literature?

13 A. I have seen water effect ratios typically more in the  
14 range of 2 and half to 10, somewhere in that, although,  
15 I, myself, have generated data in other streams  
16 associated with storm events that have shown water effect  
17 ratios upwards of 40.

18 Q. Could you explain to the board mechanistically what's  
19 happening in the site-specific water, why a water effects  
20 ratio would be 6 instead of the ambient water quality  
21 standard developed in lab water?

22 A. Sure. Remembering that an ambient water quality criteria  
23 is derived off of straight laboratory dilution water, and  
24 that the water effect ratio is testing in a natural  
25 water, anything that comes into that natural water that

**AR 056669**

1 has an effect on the bioavailability of the metal, in  
2 other words, the availability of that metal to be taken  
3 up by the organism, will change that, will reduce the  
4 toxicity, if you will.

5 In the case of a storm event or something of that  
6 nature, if you think of the types of materials that can  
7 affect that bioavailability, chiefly, in the case of  
8 copper, being dissolved organic carbon, dissolved organic  
9 carbon is basically the brown material, if you will, that  
10 runs into the stream, and it has the ability to bind up  
11 metals and make them such that they are not available to  
12 the organism and, thus, reduces the toxicity to the  
13 organism.

14 Q. Have you reviewed any recent base flow instream  
15 monitoring at the Port of Seattle?

16 A. I have.

17 Q. And what constituents does it focus on?

18 A. Chiefly copper and zinc.

19 Q. Do you know why it focuses on copper and zinc?

20 A. Previous studies that have been done at the port that  
21 looked at a number of additional metals have indicated  
22 that the concentrations of those metals are either below  
23 detection or are below levels that have been shown to be  
24 of concern, i.e., are below state standards or federal  
25 standards.

**AR 056670**

1 Q. And was this monitoring done instream?

2 A. My understanding is, yes, that's correct.

3 Q. What does that data show in your opinion for copper in  
4 Miller and Walker Creeks?

5 A. From the most recent study, the studies that I have  
6 reviewed, what it showed is that copper concentrations in  
7 Miller and Walker Creeks are below the acute and the  
8 chronic standards that have been laid out by the State of  
9 Washington.

10 Q. And do you have an opinion what the data shows with  
11 respect to zinc in Miller and Walker Creek?

12 A. It is also below applicable state and state standards for  
13 acute and chronic exposure.

14 Q. Could you discuss what the data shows for copper and zinc  
15 in Des Moines Creek?

16 A. There are exceedances that have been observed in Des  
17 Moines Creek and the tributaries to Des Moines Creek.

18 Q. How would you characterize those exceedances?

19 A. They are transient and associated with the storm flow  
20 event, so when you have the storm flow event, you get the  
21 runoff; as that dissipates, then the concentrations drop  
22 back down to what would be more consistent with base  
23 flow.

24 Q. With respect to copper in Des Moines Creek, do you have  
25 an opinion about whether a site-specific WER could be

**AR 056671**

1 developed for Des Moines Creek and what effect that will  
2 have?

3 MR. POULIN: Objection, compound.

4 MS. COTTINGHAM: You can ask it as two  
5 questions.

6 Q. (Continuing By Mr. Pearce): Do you have an opinion with  
7 respect to copper in Des Moines Creek whether a  
8 site-specific water effect ratio can be developed?

9 A. Certainly one can be developed.

10 Q. And do you have an opinion about the range of the  
11 site-specific ratio that's likely to occur?

12 MR. POULIN: Objection. There's inadequate  
13 foundation.

14 MR. PEARCE: He has already testified about the  
15 range-finding studies, Your Honor.

16 MS. COTTINGHAM: I am going to overrule the  
17 objection.

18 A. I answer?

19 Q. Yes.

20 A. I would expect water effect ratios to certainly be  
21 present in the stream, and I would expect they would  
22 range somewhere in the range of what I've seen both in  
23 the literature and from what was previously reported by  
24 Parametrix to be in the range of, you know, 5, 10,  
25 something of that nature.

**AR 056672**

1 Q. What would the effect of a water ratio of even 3 be with  
2 respect to the exceedances of copper you have seen in Des  
3 Moines Creek?

4 A. It would make it so that there were no longer an  
5 exceedance; in other words, the standard would be higher  
6 and the exceedance wouldn't exist.

7 Q. What is your opinion about what the instream monitoring  
8 shows with respect to zinc in Des Moines Creek?

9 A. It is basically the same situation. There are  
10 exceedances of the zinc standard, but that it is likely  
11 that a water effect ratio associated with zinc would  
12 increase the state standard and there would be no  
13 exceedances, or if there were exceedances, that  
14 appropriate measures can be taken to reduce the  
15 concentrations of zinc to below whatever the appropriate  
16 standard would be.

17 Q. And do you have an opinion about whether the ambient  
18 water quality standards for copper and zinc can be met at  
19 the airport?

20 A. I believe with the inclusion of site-specific  
21 modification, that there should be no reason that you  
22 cannot meet and protect the system, so meet the  
23 appropriate standard and provide the desired level of  
24 protection.

25 Q. And I asked you about a WER for copper in the range of 3.

**AR 056673**



1 I just want to make sure that we're clear. Your  
2 testimony is that the range would likely be --

3 MR. STOCK: This is leading, Your Honor.  
4 Could he ask a direct question, please.

5 Q. I asked you about a WER as an example, a hypothetical  
6 about a WER for copper in the range of 3. What is your  
7 opinion about what the likely WER for copper would be?

8 A. Based on the extent of empirical data, it is likely that  
9 that value will be higher than 3. The data generated by  
10 Parametrix suggests that it is in the range of 7 to 16.

11 Q. And what would that mean in your opinion for exceedances  
12 of copper in Des Moines Creek?

13 A. It would certainly mean there wouldn't be any  
14 exceedances.

15 Q. Thank you, Dr. Stubblefield. I have no further  
16 questions.

17 MS. COTTINGHAM: Do you have any questions?

18 MR. YOUNG: No questions.

19 MR. STOCK: I don't have any questions.

20 MS. COTTINGHAM: Did you say you do not have  
21 any?

22 MR. STOCK: I do not have any for this witness.

23 MR. POULIN: Yes.

24 ////

25 ////

**AR 056674**

EXAMINATION

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BY MR. POULIN:

Q. Dr. Stubblefield, I'm Rick Poulin for CASE. You're a relative newcomer to these proceedings?

A. I am.

Q. And you did not submit a declaration earlier in this appeal, did you?

A. I'm not sure what you mean.

Q. I guess you did not. When did you first become involved in the third runway master plan update projects at issue here?

A. About a year ago I was asked to start looking at the issue of water effect ratios in the streams associated with the port, with the airport.

Q. I'm sorry, I missed your initial response. When did your involvement begin?

A. About a year ago.

Q. About a year ago.

A. Maybe a little more. I don't know. I can't remember specifically.

Q. You were not personally involved in the range-finding studies?

A. That's correct.

Q. And you did not assist in the 1999 sampling effort?

A. Not personally.

**AR 056675**

1 Q. Or the analysis of the data?

2 A. I have seen that data and we are in the process of doing  
3 the analysis of that data.

4 Q. And, likewise, with the excluded draft 2000 material, you  
5 weren't involved in preparing that?

6 A. What do you mean by the excluded? Can you specifically  
7 tell me, I'm sorry.

8 Q. The April 2000 memorandum that you were asked about.

9 A. I did not prepare that memorandum, that's correct.

10 Q. There's not a section in your prefiled testimony  
11 discussing your familiarity with the voluminous documents  
12 we've all been talking about for the past ten days. Have  
13 you reviewed any of the annual stormwater monitoring  
14 reports?

15 A. I have seen some of the earlier stormwater reports, yes.

16 Q. You have seen them. Have you reviewed them in any  
17 detail?

18 A. I'm familiar with the data and I have read them. I can't  
19 repeat them to you verbatim.

20 Q. Have you reviewed the 1997 stormwater receiving  
21 environment monitoring report?

22 A. I think I have focused more on some of the more recent  
23 data, I think there's like a 2000 report and '99 report,  
24 perhaps.

25 Q. Okay. Now, you cite in your testimony on page 8 a report

**AR 056676**

1           that you refer to as Herrera 2001?

2       A.   That's correct.

3       Q.   And that is better known to us as Exhibit 686.  Would you  
4           agree that's the 2001 City of Des Moines water quality  
5           monitoring program?

6       A.   Yes.

7                       MR. PEARCE:   Can the witness see it?

8                       MR. POULIN:   Certainly.

9       A.   That is the report that I am familiar with.

10      Q.   So you have reviewed this 5-year project report?

11      A.   I have.

12      Q.   And would you agree that this report was undertaken by  
13           the City of Des Moines and it involved - well, I'll leave  
14           it at that - that the City of Des Moines contracted with  
15           Herrera consultants to perform this study?

16      A.   I honestly don't know how this report came about.  It  
17           says that it is the City of Des Moines report.  I assume  
18           that that's what it is.

19      Q.   And it involved a 5-year monitoring program that looked  
20           at receiving water in three streams including Des Moines  
21           Creek?

22      A.   That is what the data suggests, yes.

23      Q.   And you cite this report with reference to the typical  
24           range of dissolved copper and zinc in Des Moines Creek?

25      A.   That's correct.

**AR 056677**

1 Q. Do you know where the instream samples for this report  
2 were taken?

3 A. Not specifically, because the report is inadequate in  
4 telling specifically where all of the samples were taken.  
5 However, there is one location that was identified; it's  
6 downstream of the airport, I believe it's substantially  
7 downstream of the airport, that is referred to in, I  
8 can't remember, it's like table 2. There's a series of  
9 large tables.

10 Q. I was going to offer figure 1, which follows page 3.

11 A. Actually, what I had looked at was table B1 and B2, which  
12 are the actual data as opposed to a figure.

13 Q. But you agree that the monitoring on Des Moines Creek is  
14 substantially downstream from the Port of Seattle  
15 stormwater discharges?

16 A. It is substantially downstream, is my understanding, yes.

17 Q. Are you aware that this Herrera study concluded that  
18 dissolved copper concentrations in Des Moines Creek  
19 significantly decreased downstream during storm flow?

20 A. No, quite honestly, because I focused primarily on the  
21 data only in this report. I did not look at the  
22 conclusions of the report.

23 Q. You're not suggesting that the report does not include  
24 data substantiating that conclusion, are you?

25 A. I don't know whether the report includes that or not. As

**AR 056678**

1 I said, I used the report merely to look at the base flow  
2 data that is reported in tables B1 and B2 and, frankly, I  
3 was trying to reach my own conclusions, excluding -- I  
4 wasn't interested in what their conclusions were.

5 Q. Okay. So you didn't look at the analysis of water  
6 quality?

7 MR. PEARCE: Objection, asked and answered.

8 MR. POULIN: That's a brand-new question, Your  
9 Honor.

10 MR. PEARCE: He said he only looked at the  
11 tables.

12 MR. POULIN: I'm confirming my understanding of  
13 the witness's testimony.

14 A. Could you restate.

15 MS. COTTINGHAM: I'll allow the question.

16 Q. (Continuing By Mr. Poulin): You did not look at the  
17 sections addressing water quality?

18 A. To the extent that the data that are contained in tables  
19 B1 and B2 have metals concentration data, I looked at  
20 that. I did not look at a comparison in this report  
21 between those values and what standards, the appropriate  
22 standards would be. So I did not look at any comparison  
23 thereof.

24 Q. Okay. And by tables B1 and B2, you're referring to  
25 appendix B, the water quality data base?

**AR 056679**

1 A. It is my understanding it is the raw data upon which the  
2 report was based.

3 Q. So that's just the numbers?

4 A. That is just the numbers, that's correct.

5 Q. It's not the report's discussion of the significance of  
6 those numbers?

7 A. That's correct.

8 Q. Are you aware that Washington State class AA water  
9 quality criteria apply to Des Moines Creek?

10 A. I have read that.

11 Q. Are you aware that this study compared the stormwater  
12 sampling results to the class AA water quality criteria  
13 in Des Moines Creek?

14 A. No, because I have not read the detailed portion. As I  
15 said, I didn't read the discussion portion of this  
16 report; I relied on only the data reported in tables B1  
17 and B2.

18 Q. So then you're not aware that this study concluded that  
19 over the 5-year monitoring period --

20 MR. PEARCE: Objection. Counsel is just  
21 testifying. The witness has said over and over and over  
22 that he used tables B1 and B2 and has no opinion about  
23 the conclusion of the --

24 MR. POULIN: This individual has been offered  
25 as an expert with an opinion relevant to copper in Des

**AR 056680**

1 Moines Creek and I'm exploring the adequacy of his  
2 factual familiarity with the issues that we've been  
3 discussing here.

4 MS. COTTINGHAM: But you keep referring to a  
5 part of the report that he says he hasn't read, so you  
6 can explore his general understanding, but he's already  
7 answered that he only looked at the data in this report,  
8 so narrow your questions.

9 Q. (Continuing By Mr. Poulin): You haven't compared that  
10 data to water quality criteria?

11 A. Actually, I did do a brief comparison of the data to the  
12 appropriate standards.

13 Q. And did you see any data that would cause you to disagree  
14 with the study's conclusion that 40 percent of the  
15 stormwater samples taken at the upper Des Moines Creek  
16 sampling station violate --

17 MR. YOUNG: Objection. He is just testifying.

18 MS. COTTINGHAM: Sustained.

19 A. I don't know what the study concluded, Counselor, I'm  
20 sorry.

21 Q. Okay. So you didn't use information about dissolved  
22 copper that's available from further upstream at Des  
23 Moines Creek; you chose to use the Herrera study instead?

24 A. I looked at the Herrera study with one intent and that  
25 was to see if I could get some idea of what the

**AR 056681**



1 relationship between total recoverable and dissolved  
2 copper values were instream. It was one of the few  
3 studies that actually had both dissolved and total  
4 recoverable values. That is the reason that I used the  
5 data in B1 and B2.

6 Q. Haven't you seen information produced by the Port of  
7 Seattle that reflects dissolved and total copper?

8 A. I said in addition to the studies that I have been  
9 involved with recently, that is the only study that has  
10 actual instream data that has both total recoverable and  
11 dissolved values.

12 Q. So, again, I ask, you're not familiar with the 1997  
13 stormwater receiving environment monitoring report?

14 A. I have seen the report; I have not reviewed the report in  
15 depth.

16 Q. So you're not familiar with its discussion of dissolved  
17 and total copper instream?

18 A. I have not read the report.

19 Q. Now, with respect to this 1999 range-finding study that  
20 you've attached as exhibit C to your prefiled testimony,  
21 and has also been introduced today and admitted for  
22 background purpose.

23 MR. PEARCE: I'm not sure if that's how it's  
24 been admitted.

25 MS. COTTINGHAM: Give me the number.

**AR 056682**

1 MR. POULIN: 1118.

2 MS. COTTINGHAM: That was admitted. I  
3 overruled the hearsay objection.

4 MR. POULIN: Okay.

5 Q. Now, this is a preliminary aspect of generating a WER?

6 A. That's correct.

7 Q. Is this effort directed to a total recoverable WER or a  
8 dissolved WER?

9 A. Actually, it would be applicable to either one of them,  
10 quite frankly, because this was a range-finding study and  
11 in so doing the range-finding study, the reason it is a  
12 range-finding study is they relied on nominal  
13 concentrations of metals, i.e., they were not measured  
14 concentrations. And because of that, it gives you an  
15 indication of what either a total recoverable or a  
16 dissolved WER would be.

17 Q. But nominal means --

18 A. Unmeasured.

19 Q. -- being such in name only, so-called or punitive?

20 A. I'm sorry, could you rephrase that.

21 Q. Nominal means being such in name only, so-called or  
22 punitive?

23 A. Nominal in the parlance of toxicology for what we are  
24 talking about right now means an unmeasured  
25 concentration. It means, for example, if you're baking a

**AR 056683**

1 cake, I think I added a cup of flour, but unless I  
2 actually measured the cup of flour, then I can't say for  
3 certain that it was a cup.

4 Q. So they are purporting to measure the effect of copper,  
5 but they didn't measure the copper?

6 A. That's correct.

7 Q. Now, I'm somewhat confused by this report. It does not  
8 appear to report any LC 50 statistics. It appears, if  
9 you look at page 4 of this 1999 study, that every sample  
10 resulted in 100 percent survival; isn't that right?

11 A. Give me a moment to find that to refamiliarize myself.

12 MR. YOUNG: Which number exhibit are we on?

13 MR. POULIN: It's Exhibit 1118, page 4.

14 A. Table 3 on page 4 indicates that there was 100 percent  
15 survival in all of the site waters. So in answer to your  
16 question, an LC 50 could not be calculated or, more  
17 correctly, an LC 50 would be reported as greater than 100  
18 percent.

19 Q. So it's not possible to generate a WER without  
20 determining what the LC 50 is, is it?

21 A. Actually, it is possible to generate a WER without  
22 generating an LC 50. This portion of the report is  
23 really not WER, per se. This portion of the report was  
24 some screening-level studies that were done where water  
25 was taken and brought in and organisms were tested in the

**AR 056684**

1 water, but it was not the kind of side-by-side test that  
2 is done generally for the water effect ratio.

3 Q. Well, there's nothing in this report that indicates how  
4 the WER ratio was arrived at, is there?

5 A. In this particular portion of the report -- I'm familiar  
6 with the other reports, frankly, for purposes of the WER,  
7 the generation of the WER.

8 Q. But this report, which you use in your prefiled testimony  
9 to support a WER in the range of 6.7 to 16, provides no  
10 basis for how those numbers were arrived at, does it?

11 A. This portion of the report does not, you are correct.

12 Q. So you have not provided either with your testimony or in  
13 this exhibit supporting data to back up the table in your  
14 prefiled testimony?

15 A. I believe that that information is contained in the other  
16 exhibit that was pulled previously. I don't remember the  
17 number specifically, I'm sorry.

18 Q. That's the exhibit that was described as double or triple  
19 hearsay. Well --

20 A. This report contains --

21 MR. STOCK: There is no question outstanding,  
22 Ms. Cottingham.

23 Q. (Continuing By Mr. Poulin): Is the fathead minnow a  
24 fresh-water species?

25 A. Is the fathead minnow a fresh-water species? Yes, it is.

**AR 056685**

1 Q. Back to your prefiled on page 12. I'm somewhat curious,  
2 do I understand you correctly you're stating that the  
3 water quality criteria that we start with is overly  
4 conservative because it's based on laboratory water?

5 A. I'm sorry, where are you in the text?

6 Q. I'm not referring specifically to the text, I'm just  
7 asking about --

8 A. I'm sorry, you said page 12. I was confused for a  
9 moment.

10 Q. We'll get to there. Is it your testimony that the water  
11 quality criteria are overly conservative because they're  
12 based on laboratory water?

13 A. No, it is not. What I've said is that a water quality  
14 criteria can be both overly or under protective, in some  
15 cases, but the preponderance of the data that I'm  
16 familiar with has shown that water quality criteria on a  
17 site-specific basis do in fact tend to over protect and  
18 are overly protective in that respect.

19 Q. You state on page 6 that the acute water quality criteria  
20 for copper at 50 milligrams of hardness --

21 A. Yes.

22 Q. -- is 8.86?

23 A. That's correct.

24 Q. And, yet, on table 2 on page 12, the column referring to  
25 hardness normalized, the copper, indicates that the LC 50

**AR 056686**

1 is -- I'm sorry, I'm looking at the wrong --

2 In the second column, this table indicates that the  
3 LC<sub>50</sub> for copper is 9.2 with laboratory water, and the  
4 second column indicates that when hardness is normalized,  
5 it's 4.9, so I'm curious to see those samples  
6 substantially less than the water quality criteria  
7 reported on page 6.

8 MR. PEARCE: Counsel is providing testimony,  
9 not asking a question.

10 Q. I didn't phrase that question properly. I'll withdraw it  
11 given the lack of time.

12 Now, in your testimony, you state that you are  
13 familiar with more recent data that was not provided with  
14 your testimony, but in paragraph 27 of your statement on  
15 page 16, you state that the instream monitoring results  
16 have shown limited exceedances at some locations for  
17 storm events in Des Moines Creek?

18 A. That's correct.

19 Q. So do I understand you to be stating that the data you  
20 have seen indicate that the current water quality  
21 criteria are being violated?

22 A. No, actually, what I'm saying there is that we have seen  
23 limited exceedances in some locations, and by some  
24 locations, I mean predominantly the samples that were  
25 taken in the west branch of Des Moines Creek, the east

**AR 056687**

1 branch of Des Moines Creek and Des Moines Creek below the  
2 weir.

3 Q. Thank you. You've answered my question. And the --

4 A. I'm sorry, I'd like to expand on that if you don't mind.

5 MS. COTTINGHAM: The attorney on the other side  
6 will be able to bring that out on cross examination.

7 MR. PEARCE: I would object to counsel cutting  
8 the witness off mid answer when he is trying --

9 MR. STOCK: He didn't cut him off, Ms.  
10 Cottingham. I think you properly instructed the witness.

11 MR. PEARCE: Who gets to instruct the witness.

12 MS. COTTINGHAM: Let's maintain the high level  
13 of civility we've had so far to date and proceed. We  
14 haven't had a break this morning, which might be the  
15 reason that we are getting this way. Why don't you  
16 continue, Mr. Poulin, and we will finish this witness and  
17 I think what we'll do is take an early lunch break.

18 Q. (Continuing By Mr. Poulin): Dr. Stubblefield, after  
19 looking at the water quality criteria and the range-  
20 finding study, you did not calculate the water quality  
21 criteria that you believe is likely to result from the  
22 port process?

23 A. I did not.

24 Q. And you did not compare the resulting site-specific water  
25 quality to current discharge levels?

**AR 056688**

1 A. In so much as I looked at the values and said that a  
2 factor of 2, factor of 3 would probably be higher, would  
3 indicate that the standard, the applicable standard would  
4 be higher, that is the extent to which I did that. I  
5 don't have the data upon which to say quantitatively what  
6 the water effect ratio is likely to be, and so until  
7 those data are actually available and those studies have  
8 been conducted in a definitive fashion, I can't tell you  
9 specifically what the appropriate standard would be.

10 Q. But you did state that for a range of 3, there would no  
11 longer be any exceedance in Des Moines Creek; wasn't that  
12 your testimony?

13 A. With respect to copper?

14 Q. Yes.

15 A. I said that a factor of 3 would probably be sufficient.  
16 That's based on a qualitative evaluation of the data  
17 rather than a quantitative evaluation.

18 Q. Now, the lower end of the range that you reported in your  
19 prefiled testimony is 6.7; isn't that right?

20 A. That is what the Parametrix report says, you're right.

21 Q. And if we round that up to 7 and multiply it times a  
22 range of 3, a resulting acute water quality criteria  
23 would be 27, isn't that right?

24 A. I don't know because the water quality criteria is  
25 hardness dependent. If you take the hardness with which

**AR 056689**



1 that is appropriate, yeah, we can make those sorts of  
2 assumptions.

3 Q. And are you aware that over half of the stormwater  
4 discharges from SDS 3 exceed 0.29 copper?

5 MR. YOUNG: Objection, lack of foundation.

6 MS. COTTINGHAM: Sustained.

7 Q. (Continuing By Mr. Poulin): Please turn to the 2001  
8 stormwater monitoring report, that's Exhibit 6, page 106.

9 A. Which page?

10 Q. It's page 106. It's a handwritten number on the right  
11 margin or, rather, the left margin, three quarters of the  
12 way back in the exhibit.

13 MS. COTTINGHAM: We don't have any handwritten  
14 on ours.

15 A. I don't have any handwritten notes.

16 MR. POULIN: I think we've been down this path  
17 before, and I would like to stop the clock if it's  
18 necessary to reorient you.

19 MS. COTTINGHAM: We are on page 106, but we  
20 have no handwritten. I think you're looking at a wrong  
21 version.

22 MR. POULIN: Well, I'm looking at Exhibit 6 as  
23 it was introduced in the John Drabek deposition. And  
24 does your page 106 say page 2 of 6?

25 MS. COTTINGHAM: Yes.

**AR 056690**

1 MR. POULIN: And NPDES composite statistic.

2 MS. COTTINGHAM: Yes.

3 Q. (Continuing By Mr. Poulin): Right in the center column,  
4 SDS 3 results are reported and the column shows that the  
5 25th percentile, sorry, the median percentile for copper  
6 is 0.29. Do you see that?

7 A. Okay. Yes, it does say 0.29.

8 Q. That indicates that fully half of the samples were  
9 greater than 0.29; isn't that right?

10 A. Frankly, sorry, I don't know specifically what all of  
11 this data is based on. The value says 0.29. It says  
12 that it is the NPDES composite statistics.

13 Q. And the median value is the one that's right in the  
14 middle?

15 A. That's more or less correct. It's not an arithmetic  
16 mean, there's a difference between mean and median.

17 Q. Indeed. So half the samples are below and half above?

18 A. Above the 0.29 number.

19 Q. And we just discussed that the WER would be 0.27 with a  
20 range of 3?

21 A. The WER would be 0.27, I'm sorry?

22 Q. The water quality criteria resulting from a WER of 3  
23 would be 27, which translates to 0.27?

24 A. I am sorry, Counselor, I'm not sure where you're getting  
25 the 27. I need to know what the hardness is. The

**AR 056691**

1 hardness will fluctuate, excuse me, the standard will  
2 fluctuate with whatever the hardness is at the time the  
3 sample was taken. You can take a mean hardness if you  
4 want and try to evaluate what the appropriate standard  
5 would be, but the standard will, in fact, fluctuate with  
6 the hardness of that water.

7 Q. And are you familiar with the receiving water data that  
8 indicates that the hardness in Des Moines Creek drops  
9 during storm events?

10 MR. YOUNG: Object. Lack of foundation.

11 MS. COTTINGHAM: I am going to allow the  
12 question. You may answer his question.

13 A. Would you please restate it for me.

14 Q. Are you familiar with receiving water data that indicates  
15 that the hardness in Des Moines Creek drops during storm  
16 events?

17 A. I am familiar with data that shows that the hardness in  
18 Des Moines Creek does in fact drop associated with a  
19 stormwater event.

20 Q. Thank you. No further questions.

21 MS. COTTINGHAM: Any redirect?

22 MR. PEARCE: Very briefly, Your Honor.

23 ////

24 ////

25 ////

**AR 056692**

1 EXAMINATION

2 BY PEARCE:

3 Q. I believe Mr. Poulin asked you whether you used dissolved  
4 copper data in addition to Herrera, and maybe I am  
5 mistaken, but just to clarify, did the more recent  
6 sampling from the Port of Seattle have dissolved copper  
7 data?

8 A. It did.

9 Q. And was that instream data?

10 A. That is.

11 MR. POULIN: I object to this testimony in  
12 that this information has not been provided, it's not  
13 been made an exhibit, it's not been discussed in any  
14 detail in the prefiled testimony, and to admit this  
15 information in this form I think is improper. It's not  
16 being used to support the expert's opinion, it's simply  
17 being offered through direct testimony when it's not  
18 previously been made available.

19 MS. COTTINGHAM: Can I ask a clarifying  
20 question. By this, you mean what?

21 MR. POULIN: I mean the results of the instream  
22 monitoring data that Port of Seattle ostensibly has done  
23 recently.

24 MR. PEARCE: I can clarify that if you would  
25 like.

**AR 056693**

1 Q. Could you take a look at Exhibit 1319.

2 MR. POULIN: I'm told there's an outstanding  
3 objection to this, not only hearsay but also untimely  
4 provided. I'd also note that it's a preliminary draft  
5 subject to quality assurance review.

6 MR. PEARCE: Is there an objection to that or  
7 does he want to see it? He said he wanted to see it.

8 MR. STOCK: That's the objection.

9 MR. POULIN: The objection is this is not  
10 properly in evidence and you're asking a witness about it  
11 and I think that's improper.

12 MR. PEARCE: It doesn't have to be properly in  
13 evidence in order for me to ask an expert witness about  
14 data that he has reviewed. I have not offered it as an  
15 exhibit in evidence. We're happy to offer it if counsel  
16 would like.

17 MR. STOCK: It goes to the foundation and there  
18 is no foundation. It's an improper exhibit and there is  
19 an exhibit on the matrix on untimely and hearsay, and  
20 Mr. Poulin's pointed out that it's a preliminary draft.

21 MR. PEARCE: The witness has testified and he  
22 is allowed to testify to data that he has reviewed, under  
23 Evidence Rule 703. This data is marked as an exhibit.  
24 We don't need it in evidence in order for Dr.  
25 Stubblefield to rely on that data and rely on what he

**AR 056694**

1 knows and what he has reviewed.

2 I would note that this data was supplied to ACC  
3 prior to the end of discovery, prior to the end of when  
4 they could have taken depositions regarding it. It's not  
5 necessary for us to enter it into evidence for the truth  
6 of the matter asserted. It's the type of evidence that  
7 Dr. Stubblefield can rely on.

8 MR. POULIN: There's a major difference between  
9 allowing an expert to base his opinion on inadmissible  
10 hearsay evidence and using expert testimony to introduce  
11 that evidence to the proceeding.

12 MR. STOCK: Right.

13 MR. POULIN: There was no question about the  
14 witness's opinion or the basis for it, it was a question  
15 about inadmissible hearsay that --

16 MR. PEARCE: That's what the testimony is, it's  
17 his opinion regarding whether water quality standards are  
18 exceeded in these creeks.

19 MR. STOCK: But Mr. Pearce --

20 MS. COTTINGHAM: I'm going to sustain the  
21 hearsay objection, I'm going to allow the witness to  
22 testify as an expert, so long as this evidence doesn't  
23 come in to show the truth of the matter asserted.

24 MR. PEARCE: We're not offering it as an  
25 exhibit. Our expert is relying --

**AR 056695**

1 MR. STOCK: But he is, and Mr. Pearce is being  
2 very selective in how he is responding to you, he is  
3 offering it through this witness for the truth of the  
4 matter asserted and that is hearsay. So your ruling is  
5 it can't be used for the truth of the matter asserted.

6 MR. PEARCE: Your Honor, if you look at  
7 Evidence Rule 703.

8 MR. STOCK: Mr. Pearce is making the same  
9 flawed point. It doesn't get over the competency of the  
10 evidence. He is trying to use this evidence in an  
11 improper way. He's trying to bring it in through this  
12 witness for the truth of the matter asserted.

13 MS. COTTINGHAM: And I'm going to sustain the  
14 objection on hearsay. Not only is it a preliminary  
15 draft, but there is no one here to cross examine on the  
16 data.

17 Q. (Continuing By Mr. Pearce): Could you look at the  
18 exhibit Mr. Poulin showed you, that's Exhibit Number 6,  
19 page 106. Do you know whether any of this data shown  
20 that Mr. Poulin referred you to, any of the sampling from  
21 this table was taken instream?

22 A. Given the fact that it's the NPDES monitoring data, my  
23 understanding is that none of this data is taken from  
24 instream. According to this table, it shows that it is  
25 taken from SDS 3, which is an outfall at the facility.

**AR 056696**

1 Q. Okay. Thank you. No further redirect.

2 MS. COTTINGHAM: Any questions from the board?

3 MR. JENSEN: No.

4 MR. LYNCH: I have a couple quick questions.

5

6 EXAMINATION

7 BY MR. LYNCH:

8 Q. Thank you for your testimony today. I'm just trying to  
9 understand WERS a little bit better, just some general  
10 questions about them. When a WER is done and it's  
11 completed, is it for a certain segment of a stream from  
12 point to point that you do samplings from one end to  
13 another end and then the WER that's derived is effective  
14 for between those two points; is that how it works?

15 A. It actually can be both. If you look at the EPA's  
16 guidance document, there is what's referred to as a type  
17 1 or a type 2 water effect ratio. Type 1 water effect  
18 ratios are generally done at a point source discharge, so  
19 in that case, you're looking at immediately below a  
20 discharge point and looking at what the appropriate  
21 criteria is at that point.

22 A type 2 WER is more of a more general water body  
23 sort of WER and it's basically, for point of  
24 clarification, is probably segment by segment would be a  
25 way to look at it.

**AR 056697**



1           By and large, what the scientific definition is for  
2 a type 2 is it is applicable to a range in the stream or  
3 the lake which is consistent in terms of its water  
4 quality type, its environmental habitat, the type of  
5 organisms that live there, et cetera. So, for example,  
6 if you're talking about a stream that's, say, a high  
7 rocky mountain stream and then falls out on to the  
8 plains, your range for applicability might be over the  
9 range of the mountainous segment, if you will, but as it  
10 drops out on to the plains, you see a change in water  
11 because the water will generally slow down, you might  
12 drop down your suspended solid load, water might actually  
13 warm up in temperature, the types of organisms that  
14 reside there might change. So you would draw a  
15 definition instead of a statutory type definition, say,  
16 segment by segment, you might draw a definition based on  
17 the type of habitat that's there.

18 Q. Thank you. And my last question is, in order to do a  
19 WER, is it outlined that you have to do a standard number  
20 of samples or tests in a particular way or is it just a  
21 best professional judgment?

22 A. No, there is definitely a guidance document that EPA has,  
23 and I think if you look in my testimony, I have  
24 referenced all of the appropriate documents, but there's  
25 approximately four documents that have been developed

**AR 056698**

1 since roughly 1985 that outline exactly how the EPA  
2 recommends that a water effect ratio be derived, and it  
3 is very specific in terms of the numbers of samples to be  
4 taken and it is very specific in terms of the type of  
5 organisms to be tested and how those tests are to be  
6 conducted.

7 MR. LYNCH: Thank you. No further questions.

8 MS. COTTINGHAM: Are there any questions as a  
9 result of the board's questions?

10 MS. COTTINGHAM: Mr. Pearce, do you have any  
11 questions?

12 MR. PEARCE: No questions.

13 MS. COTTINGHAM: Mr. Poulin?

14 MR. POULIN: No questions.

15 MS. COTTINGHAM: Thank you. You're excused.  
16 With that, I suggest that we take a lunch break and come  
17 back at 1 o'clock.

18 I'm going to ask for the accounting on the time just  
19 to make sure we're tracking. How much have appellants  
20 used?

21 MR. POULIN: Appellants have used 36 minutes,  
22 40 seconds.

23 MS. COTTINGHAM: And how much have the  
24 respondents used?

25 MR. POULIN: One hour, 14 minutes, 24 seconds.

**AR 056699**

1 MS. COTTINGHAM: I'm going to recalculate and  
2 I'm going to show this afternoon, so if you want, you can  
3 start the clock over this afternoon. Thank you. And  
4 with that, we'll back at 1 o'clock.

5 (Whereupon, a recess was taken.)

6 MS. COTTINGHAM: On the record now. And I do  
7 have one other preliminary matter I'd like to ask. We  
8 have a list up here of the remaining witnesses. I would  
9 like to know just for purposes of timekeeping and keeping  
10 us on track if there will be any rebuttal witnesses that  
11 we should add to the list.

12 MR. STOCK: Yes, there will be. It will be  
13 Dyanne Sheldon, Bill Rozeboom and Patrick Lucia.

14 MR. POULIN: And possibly Greg Wingard as  
15 well.

16 MR. STOCK: And we will be able to tell you by  
17 the end of the day the order.

18 MS. COTTINGHAM: And are you all allocating  
19 your time so that you will have enough time to --

20 MR. STOCK: We're trying to budget our time.  
21 It may not appear that way, but we are trying to budget  
22 our time accordingly. But if the port would be willing  
23 to relinquish some of its time, we would be happy to  
24 accept it.

25 MS. COTTINGHAM: I won't even ask that

**AR 056700**

1 question.

2 Again, our goal is to finish up with all of these  
3 witnesses before noon tomorrow so that we can start  
4 closing arguments shortly after noon.

5 So, with that, the port can call its next witness.

6 MR. REAVIS: The port calls Linn Gould.

7

8 LINN GOULD, having been first duly sworn on oath or  
9 affirmed to tell the truth, the whole truth and nothing  
10 but the truth, testified as follows:

11

12

EXAMINATION

13

BY MR. REAVIS:

14

Q. Please state your name for the record and spell your  
15 first and last names.

16

A. It's Linn, L-I-N-N, Gould, G-O-U-L-D.

17

Q. And, Ms. Gould, what is your current occupation?

18

A. I am the owner of an independent environmental consulting  
19 firm called Erda Environmental Services.

20

Q. Is a copy of your CV attached to your prefiled testimony?

21

A. Yes, it is.

22

Q. Can you describe for the board, just give us a brief  
23 summary of your educational background.

24

A. Yes. I have an undergraduate degree in geology from

25

Smith College. I also have post-graduate experience in

**AR 056701**

1 toxicology and risk assessment from the University of  
2 Washington. I did my master's in soil science at the  
3 University of Wisconsin at Madison.

4 Q. Can you describe for us what you do as a risk assessor?

5 A. Sure. Basically, as a risk assessor, I examine the  
6 adverse effects of potential contaminants on sites. I  
7 have been working as a risk assessor for the past 15  
8 years. I've been working with MTCA since its inception  
9 on risk assessment issues.

10 Q. And that's the Model Toxics Control Act?

11 A. That's true.

12 Q. How does that differ from being a soil scientist?

13 A. Well, the work that I've done is basically combining the  
14 concept of soil science and fate and transport of  
15 contaminants through soils with risk assessment, so I  
16 look at contaminants in soils and I evaluate whether the  
17 contaminants in soils can be a risk on human health and  
18 the environment.

19 Q. Could you give us a little background then on the work  
20 that you have done specifically with regard to MTCA and  
21 regulations promulgated under MTCA?

22 A. Yes. For the past, let's see, starting in about 1995 or  
23 1996, MTCA was going to be revised and the policy  
24 advisory committee got together and I was a person  
25 working on the policy advisory committee to work on risk

**AR 056702**

1 assessment issues in order to revise MTCA. And then the  
2 other thing was that in 1996, I was hired as the TPH  
3 project manager for a project oversight group that was --  
4 basically, we were assigned the 3-year project to revise  
5 the TPH regulations for Washington State and for MTCA.  
6 And it was an interagency agreement where I was hired by  
7 the Department of Ecology, EPA, City of Seattle, King  
8 County, Port of Seattle, and several other agencies, and  
9 it was an interagency agreement for me to help rewrite  
10 the MTCA regulations for TPH.

11 Q. How much of your work concerns petroleum hydrocarbon  
12 contamination?

13 A. I would say I do a lot of work with TPH because that is  
14 the main contamination issue in Washington State.

15 MS. COTTINGHAM: Can you define for the board  
16 TPH.

17 THE WITNESS: Yeah. TPH stands for total  
18 petroleum hydrocarbons.

19 Q. (Continuing By Mr. Reavis): Now, when were you first  
20 retained to work on the third runway project?

21 A. I think probably August of 2000.

22 Q. And since that time, what work have you performed?

23 A. I first started working on looking at borrow areas 3 and  
24 4 as potential sources for the third runway embankment,  
25 and then around January of 2001, the Port of Seattle

**AR 056703**

1 brought me into evaluate, to look at the fill criteria  
2 and insure that it would be protective of all receptors  
3 that might be exposed.

4 Q. Could you just give us a brief rundown of the elements of  
5 the embankment and where some of these things are located  
6 that we have reference to such as the drainage layer  
7 cover and so forth.

8 A. This is what we call, or at least risk assessors call, a  
9 conceptual site model of the embankment, so it's very  
10 important that I understand how the embankment from a  
11 soil science perspective and risk assessment perspective  
12 is going to be designed.

13 And there's some important components. First of  
14 all, there's this drainage layer area here. And this  
15 drainage layer area was designed to when the groundwater  
16 rises up too high during the rainy season, it's meant to  
17 basically not rise into the embankment so the embankment  
18 won't become saturated and collapse.

19 This is a drainage layer area, and this is an area  
20 of clean, very ultra clean soil per an agreement that we  
21 arranged with Fish & Wildlife Service. And it's also  
22 called the wedge, so if you ever hear "the wedge," we're  
23 talking about it looks like a wedge drainage layer cover.  
24 And then we have the general embankment fill.

25 Q. You can have a seat again. Now, did you conduct a risk

**AR 056704**

1 assessment, a risk analysis for the fill to be used in  
2 the embankment?

3 A. Yes, I did.

4 Q. Can you tell us, just generally speaking, how the water  
5 moves through the embankment?

6 A. Well, basically the point of the risk analysis of the  
7 embankment was I did what was called an exposure pathway  
8 analysis, so I evaluated what potential receptors might  
9 be exposed to potential contamination in the fill. And  
10 so we looked at water and how it goes through the fill  
11 and then how it might enter the groundwater and wetlands  
12 and go towards Miller Creek.

13 And based on the exposure pathway analysis, we  
14 decided that the most sensitive receptors that we should  
15 be protecting are receptors that reside in the creeks.

16 Q. Can you tell us what happens just from a physical  
17 standpoint with these various constituents as water  
18 passes through the embankment?

19 A. Okay. So assuming that a potential contaminant gets  
20 into the embankment. This embankment really behaves like  
21 this huge filter, sand filter, and it can filter out  
22 contaminants. And the way it filters out potential  
23 contaminants is it goes through all these natural  
24 processes that happen every single day. They're chemical  
25 processes where there's chemical transformations of

**AR 056705**



1 constituents, there's physical processes such as  
2 adsorption, which change the constituents that move  
3 through the embankment. There's natural biodegradation  
4 processes that occur inside the embankment. And then  
5 there's also dilution of constituents as rain flows  
6 through the embankment.

7 Q. You mentioned adsorption?

8 A. Right. Adsorption.

9 Q. I can't pronounce it, but can you describe that for us?

10 A. Basically, adsorption, it's a physical term where a  
11 constituent literally -- I mean, I guess you could  
12 compare it to absorb, but it's not absorbing into a rock  
13 particle because rock particles are solid, so it's  
14 adsorbing via chemical/physical process on to each  
15 particle, the edge of each particle.

16 Q. So does it sort of glob on to --

17 A. It globs on to it.

18 Q. Okay.

19 MR. STOCK: That was leading, but --

20 MS. COTTINGHAM: But it was helpful.

21 [Laughter]

22 Q. (Continuing By Mr. Reavis): Are you familiar with the  
23 biological opinion that the Fish & Wildlife Service  
24 issued for this project?

25 A. Yes, I am.

**AR 056706**

1 Q. How did you become familiar with that?

2 A. Before the biological opinion was released, the Fish &  
3 Wildlife Service came to us and they had questions about  
4 the embankment fill and they wanted to make sure that the  
5 previous criteria that the Port of Seattle had arranged  
6 with Ecology were indeed protective of aquatic receptors.

7 Q. And so did you work towards developing some criteria?

8 A. That's exactly right. I developed soil fill criteria  
9 that would be protective of aquatic receptors.

10 Q. And how did you go about developing these?

11 A. The Fish & Wildlife Service don't have soil criteria that  
12 they can prove are protective of aquatic receptors or of  
13 ambient water quality criteria, but MTCA has some models  
14 in it that you can adapt to surface water quality  
15 criteria to basically develop a soil criteria that's  
16 protective of ambient water quality criteria.

17 Q. And what's that process called?

18 A. There's a model in MTCA that's called the 3-phase  
19 partitioning approach, or the easiest way to say it is  
20 there's a back calculation model.

21 Q. And why is it called back calculation?

22 A. The reason why it's called a back calculation model is  
23 because we start with ambient water quality criteria that  
24 we want to protect for a particular constituent and then  
25 we take the equation and we back calculate to a soil

**AR 056707**

1 concentration that is protective of the water quality.

2 Q. Are you familiar with the biological opinions requirement  
3 for constituents in soil in the upper, the top most three  
4 feet of the embankment?

5 A. Yes. When we talked to Fish & Wildlife Service, they  
6 were not only worried about ambient water quality, but  
7 they were also worried -- they expressed concern that  
8 they wanted to protect terrestrial ecological receptors  
9 in the top three feet of the runway. That's where the  
10 grass strips are and the paved area.

11 Q. And what are terrestrial ecological receptors, generally?

12 A. Well, basically, they are receptors that are not aquatic  
13 receptors, they are organisms like earthworms and birds  
14 and animals that live in the top three feet of the soils.

15 Q. Now, in the course of doing these back calculations,  
16 we've had some testimony about adjustments based upon  
17 what's called a PQL. Can you just tell us what a PQL is?

18 A. A PQL is a practical quantitation limit. It's a limit  
19 where when you go to the laboratory and you measure a  
20 constituent, the instrument that's measuring the  
21 constituent can only reliably measure at that specific  
22 limit called the PQL.

23 Q. Now, I believe in your prefiled testimony you talk about,  
24 in paragraph 22, adjustment of some of these back-  
25 calculated numbers relative to Puget Sound background

**AR 056708**

1 values. Do you remember that discussion?

2 A. That's correct.

3 Q. Can you explain for us what background is, as it's been  
4 applied in this case, background concentrations? If you  
5 have demonstrative exhibits --

6 A. I do. This is called a probability density function for  
7 Puget Sound copper background. And I'm just going to  
8 explain X and Y axes because I think it will help you  
9 understand the graph.

10 On the Y axis, Puget Sound background  
11 concentrations, there was about 50 samples that were  
12 collected, and these samples were collected by the USGS  
13 and Department of Ecology together over a six-year  
14 period, and collected samples from all over Washington  
15 State. And we have about 50 samples that were collected  
16 specifically in Puget Sound background. Now, when  
17 someone asks you -- oh, actually, let me finish. So we  
18 have the X axis and this is the concentration of copper  
19 that they found in background. So in the 50 samples they  
20 found, these are pristine samples that have never been  
21 affected by anthropogenic chemicals of any type. They're  
22 dug down deep where there's been no exposure to human  
23 activities. Concentrations ranged from 0 to 250.

24 Now, when you hear someone say Puget Sound  
25 background, Department of Ecology calls Puget Sound

**AR 056709**

1 background the 90th percentile, which means, in effect,  
2 that when you go out and sample background, 90 percent of  
3 the samples are below 36 milligrams per kilogram, but 10  
4 percent are above.

5 And so the point here is that you can have samples  
6 that range from 36 to 250 that are perfectly clean, have  
7 never been affected by human activities, but they are  
8 perfectly clean and they would not exceed water quality,  
9 and, yet, this 36 milligrams per kilogram is our 401  
10 criteria.

11 Q. Now, so that's a statistical analysis, is that right?  
12 Why don't you stay up there for the next question, which  
13 is, what happens if you're sampling not just for copper  
14 but if you're sampling for multiple constituents, does  
15 that change the statistics?

16 A. Yes, it does. The important point here is that if we  
17 just sample for one constituent, we are going to exceed  
18 it, when we are sampling out at the site, we are going to  
19 exceed it 10 percent of the time just for copper. But  
20 let's say for one sample I'm also sampling -- okay, this  
21 is copper, right, this is one sample. So this is a  
22 probability of failure to meet multiple criteria.

23 And on the Y axis, this is a probability of failing  
24 at least one background criteria. For one sample, let's  
25 say copper, I'm going to exceed 10 percent of the time.

**AR 056710**

1           However, let's say I also have copper and nickel at the  
2 background concentration in the same sample. I exceed  
3 the criteria 18 percent of the time. If all of a sudden  
4 to the same sample I add the background concentration of  
5 copper, nickel and zinc, I all of a sudden am exceeding  
6 the criteria 28 percent of the time.

7           The point that I want to make is that if we have 14  
8 samples that we have to put at natural background  
9 criteria, we are going to exceed the criteria 78 percent  
10 of the time. And it's just because Department of Ecology  
11 has called 36 milligrams per kilogram the 90th  
12 percentile. But they say in their very own rules and  
13 guidance that this is incredibly conservative criteria.  
14 Many states including Canada use the 99 percent. So they  
15 just use it as just a screening criteria, but they have  
16 no problems at all with criteria being higher than the  
17 90th percentile.

18 Q. Thank you. Now, there's been some discussion in the  
19 September 401 certification of the SPLP, or synthetic  
20 precipitation leaching procedure. Can you tell us how  
21 that relates to this background discussion you just gave  
22 us?

23 A. Yes. The reason why the SPLP is really important is that  
24 the Department of Ecology calls this 90th percentile --  
25 they basically say we're going to start with this as a

**AR 056711**

1 screening criteria, but we recognize that you have a  
2 false positive or you're going to fail 10 percent of the  
3 time. And, you know, if you have more constituents, you  
4 can fail up to 80 percent of the time. So basically  
5 there's an alternative that's written into statistical  
6 guidance for Ecology project site managers, just in  
7 regular guidance, that basically says that you can  
8 develop an alternative when you exceed this criteria of  
9 36. And so what the SPLP test does is it helps you  
10 evaluate -- basically if you exceed this criteria, then  
11 you have the right to go ahead and use an SPLP test to  
12 show that it's not really causing ambient water quality  
13 problems.

14 Q. And how does the SPLP test then demonstrate that it's not  
15 really causing ambient water quality problems?

16 A. The SPLP test is what's basically considered kind of a  
17 gold standard, it's equivalent to the WET testing that  
18 Dr. Wisdom talked about yesterday. It's basically like  
19 the equivalent of a blood test in medical technology.  
20 And basically it's this test where you put the soils into  
21 this little column, just like a little plastic column,  
22 and you put synthetic acid rain into the column, and you  
23 agitate it for 24 hours, and then you evaluate what comes  
24 out of the soil column after 24 hours, and you compare it  
25 to water quality criteria.

**AR 056712**

1 Q. And the purpose for that comparison is what?

2 A. The purpose of that --

3 Q. The purpose for doing the SPLP test and then getting  
4 results from that is what?

5 A. The purpose of the SPLP test is to prove that any  
6 criteria that happens above the 90th percentile is not  
7 going to leach to groundwater or surface, to surface  
8 water.

9 Q. Okay. Now, are you familiar then with the fill criteria  
10 that are contained in the September 401 certification?

11 A. Yes.

12 Q. Can you tell us how those differ, if they do, from the  
13 fill criteria that were set forth in the biological  
14 opinion?

15 A. The difference between the two -- the FWS had this  
16 drainage layer cover, or the wedge that I was showing to  
17 you before.

18 MS. COTTINGHAM: FWS stand for Fish & Wildlife  
19 Service.

20 A. Fish & Wildlife Service.

21 Q. Let me stop you there if I could. I'm just talking first  
22 the numbers, the numeric criteria.

23 A. We develop numeric criteria.

24 Q. But can you tell us how the numeric criteria differ  
25 between the biological opinion and the 401 certification?

**AR 056713**



1 Are there things added or removed and so forth?

2 A. Okay. The Department of Ecology, when they came in after  
3 the biological opinion and wrote the 401, they added  
4 seven new constituents and including TPH.

5 Q. Do you know what the TPH values that appear in this 401  
6 certification, and, again, total petroleum hydrocarbon  
7 values in the 401 certification are based on?

8 A. Can you repeat that.

9 Q. Do you know what the TPH values that appear in the 401  
10 certification are based on?

11 A. Yes. The TPH in the 401 criteria are based on modelling  
12 results that we developed over the past three years when  
13 I was working for the project oversight group. We also  
14 hired Washington State University and a couple other  
15 agencies to help us develop the model that is now the TPH  
16 criteria in the 401.

17 Q. Do you have an opinion as to whether or not the numeric  
18 criteria for TPH in the 401 certification are protective  
19 of water quality?

20 A. They're absolutely protective.

21 Q. Have you done any calculations to demonstrate that?

22 A. Well, there's a model that exists and that I've used the  
23 model that's in MTCA to show that they're protective.

24 Q. Now, we've heard some discussion about petroleum and TPH  
25 in the course of this hearing. Are there tests to detect

**AR 056714**

1           whether or not there's petroleum in soil?

2   A.   Yes.

3   Q.   What tests are those just generically?

4   A.   They're just standard laboratory tests to test whether  
5       TPH exists in soils.

6   Q.   Can you tell us what is petroleum?

7   A.   This is probably really obvious, but petroleum is decayed  
8       plant matter that has been compressed at great pressures,  
9       and I think everyone knows you can drill for it and pump  
10      it out and use it for many, many purposes.

11  Q.   Now, are there things that exist in the natural  
12      environment in this area that can actually show up on one  
13      of these analytical tests that you have described as  
14      petroleum hydrocarbons?

15  A.   Definitely.  Because TPH or petroleum is decayed plant  
16      matter that's been highly condensed, it's absolutely  
17      normal to see TPH when you go out into the environment  
18      and test for it naturally.  You might see it in wetlands,  
19      you could probably, if you went and sent your garden  
20      soils to test for TPH, you would probably see TPH  
21      signature because it's plant decayed matter, and we often  
22      see it in glacial soils.

23  Q.   Now, were you here for Dr. Lucia's testimony?

24  A.   Yes, I was.

25  Q.   He testified about a concern he had relating to whether

**AR 056715**

1 this wedge concept that you've described was as  
2 protective as the 6-foot layer on the bottom that was in  
3 the August 401. Do you remember that testimony?

4 A. Yes, I do.

5 Q. Do you have an opinion as to whether or not the wedge is  
6 protective of water quality?

7 A. Oh, absolutely, I think it's more than protective, it's  
8 very protective.

9 Q. What does the wedge do in the design of this in order to  
10 add protection for water quality?

11 A. Well, I think the reason why the wedge is more protective  
12 is because Fish & Wildlife stipulated that they would be  
13 interested in having soils in the front of the embankment  
14 - in other words, the soils that are closest to aquatic  
15 receptors - to be at Puget Sound background so they would  
16 be extra careful that they would be protective of water  
17 quality.

18 Q. Now, have you read Mr. Pete Kmet's deposition transcript?

19 A. Yes, I have.

20 Q. Are you familiar with the testimony in there regarding  
21 sampling protocols?

22 A. Yes, I am.

23 MR. WITEK: Ms. Cottingham, we're going to  
24 object. First, this is an improper use of a deposition  
25 and, second, this is beyond the scope of the prefiled

**AR 056716**

1 testimony. And with this witness in particular, we're  
2 greatly prejudiced because we submitted interrogatory  
3 responses, asking the port to identify their expert  
4 witnesses and to explain the facts and opinions that  
5 their experts would testify to, and the port has never  
6 answered that interrogatory with respect to this witness.  
7 So we would ask that this witness' testimony be limited  
8 to things within the scope of her prefiled testimony.

9 MR. REAVIS: I don't know if we ever answered  
10 that interrogatory. I thought we answered the  
11 interrogatory for all of them. I think there's some  
12 burden on them if they believe we haven't provided  
13 adequate response to move to compel. None of that was  
14 done. If it had been done, we could have corrected it.

15 Let me respond also with regard to Mr. Kmet. We  
16 didn't realize that his entire deposition was going to be  
17 offered in this proceeding, and so what we're trying to  
18 do with this witness is respond to some of that  
19 deposition testimony, and this is really our only  
20 opportunity to do that. We are not going to have the  
21 opportunity to question Mr. Kmet himself.

22 MR. WITEK: If I could respond to that briefly.  
23 The port's interrogatory responses are actually in the  
24 record and they're Exhibit 295 if you want to look and  
25 see what they've provided with respect to Ms. Gould.

**AR 056717**

1           Also, I would like to note with respect to this  
2 suggestion that, you know, we were required to ask them  
3 for it, if you look at Rule 26(e), it talks about the  
4 circumstances under which a party has a duty to  
5 supplement. And clearly if you look at Rule 26(e)(1), it  
6 states that, "The party is under a duty to supplement  
7 their interrogatory or discovery responses regarding the  
8 identity of each person expected to be called as an  
9 expert witness at trial, the subject matter on which he  
10 or she is expected to testify and the substance of his or  
11 her testimony." And that's precisely the interrogatory  
12 that we submitted to the port.

13           MS. COTTINGHAM: Can you show me where in the  
14 interrogatory?

15           MR. WITEK: Sure. If you look at Interrogatory  
16 Number 3.

17           MS. COTTINGHAM: Page.

18           MR. WITEK: On page 10. It says, "For each  
19 person identified in the preceding interrogatory, state  
20 with particularity." And actually if you back up, you  
21 can go to Interrogatory Number 2, it says, "Identify each  
22 person you intend to call as an expert witness." I think  
23 you'll see that Ms. Gould's name is not listed there.

24           And then number 3, Interrogatory Number 3 starting  
25 on page 10 says, "For each person identified in the

**AR 056718**

1 preceding interrogatory, state with particularity the  
2 subject matter on which the expert is expected to  
3 testify, the substance of the facts and opinions to which  
4 the expert it expected to testify and a summary..." And  
5 it's not a mistake that the language in our Interrogatory  
6 Number 3 exactly parallels the language that I quoted  
7 earlier in CR 26(e) regarding the duty to supplement.

8 MR. REAVIS: I'm not sure that really the  
9 interrogatory answers is the relevant portion. They took  
10 Ms. Gould's deposition, and if she wasn't asked questions  
11 about this, I think that's because what she is doing here  
12 is providing rebuttal testimony to what we anticipate or  
13 what we know to be in Mr. Kmet's deposition. So to say  
14 we should have supplemented an interrogatory answer, when  
15 the rebuttal testimony is just now being offered, I think  
16 is getting the order reversed. So all I wanted to do is  
17 ask her a couple questions in order to deal with the  
18 testimony that we just learned at the beginning of this  
19 hearing would be provided by deposition.

20 MR. WITEK: Well, Ms. Cottingham, on this issue  
21 of, you know, that we had a chance to depose her, I would  
22 like to point out that Ms. Gould appeared on the port's  
23 October 10 witness list and submitted a declaration in  
24 support of the stay, but then her name was withdrawn from  
25 the port's November 15 witness list. We went ahead and

**AR 056719**

1       deposed her anyway and the port made her available  
2       because she had offered a declaration in support of the  
3       stay. But we conducted a very limited deposition, and  
4       the questions that I asked included, "Have you been asked  
5       to provide or prepare testimony" - and this is on  
6       December 6th - "for the hearing?" And the answer I got  
7       was, "No." Then we wanted to find out who would be  
8       providing testimony for the port, so we asked, "Do you  
9       know who the port intends to call as a witness about the  
10      fill criteria?" Answer: "Not specifically about the  
11      fill criteria." Question: "Or about the SPLP testing  
12      procedure." Answer: "I don't know."

13               Now, the point really is that we are particularly  
14      prejudiced here to the extent that Ms. Gould is going to  
15      testify beyond the things that are in her prefiled  
16      testimony because we haven't had -- our experts haven't  
17      had an opportunity to review that testimony and those  
18      opinions haven't been identified for us in advance. So,  
19      in this situation, we think it's particularly appropriate  
20      to limit the testimony to the scope of the prefiled.

21               MS. COTTINGHAM: I think the board will take  
22      about a 1-minute recess and be back in a second.

23               (Whereupon, a recess was taken.)

24               MS. COTTINGHAM: The board is going to grant  
25      the motion to limit the testimony of Ms. Gould to the

**AR 056720**

1 scope of what she put in her prefiled, and our basis is  
2 that she was not identified in the interrogatory and,  
3 thus, the other side did not have the opportunity to  
4 fully depose her.

5 MR. REAVIS: I don't have any more questions  
6 for her then.

7 MS. COTTINGHAM: Mr. Kray.

8  
9 EXAMINATION

10 BY MR. KRAY:

11 Q. Ms. Gould, in response to one of Mr. Reavis' questions,  
12 you said that you had done some calculations and used a  
13 model in MTCA. What model were you referring to?

14 A. Are you specifically referring to TPH or the metals?

15 Q. It was in between your discussion of SPLP and your  
16 discussion of TPH, but I can't tell you exactly which of  
17 those you were referencing.

18 A. We used two different models. We used a 3-phase  
19 partitioning approach or the back calculation model for  
20 metals. And then for TPH we used what is called a 4-  
21 phase partitioning approach.

22 Q. How do those two differ?

23 A. Actually, the 3-phase partitioning approach is really,  
24 really easy, a really, really conservative basic model  
25 that you can really plug in with a calculator. Anyone

**AR 056721**



1 can do it.

2 The 4-phase partitioning model is very, very  
3 complex. It took us several months to write and you plug  
4 it into a spread sheet on Excel and it does just -- it's  
5 just basically a more complex model.

6 Q. And what did you apply the 4-phase model to?

7 A. We applied it for TPH constituents in order to calculate  
8 the criteria for the 401.

9 MR. KRAY: No further questions.

10 MS. COTTINGHAM: Cross examination.

11

12

EXAMINATION

13 BY MR. WITEK:

14 Q. Ms. Gould, I am Mike Witek.

15 MR. KRAY: Excuse me. Ms. Cottingham, I just  
16 want to point out one thing. It is getting late in the  
17 process, but if Mr. Witek is conducting cross  
18 examination, then Mr. Stock had no business giving  
19 objections to any of the questions.

20 MR. WITEK: I think the only objection he gave  
21 was one in jest about Mr. Reavis' leading question, so I  
22 think we can probably move on.

23 MS. COTTINGHAM: Point made.

24 MR. KRAY: Never mind.

25 Q. (Continuing By Mr. Witek): Ms. Gould, I want to ask you

**AR 056722**

1 about the SPLP work plan, and that's attachment E to the  
2 September 401 certification.

3 You reviewed and edited this attachment for the  
4 port; is that correct?

5 A. That's correct.

6 Q. Is it your understanding that under the SPLP work plan,  
7 the port is not required to do SPLP testing unless the  
8 numeric screening criteria are exceeded; is that right?

9 A. Right.

10 MS. COTTINGHAM: Can you refer us to whatever  
11 exhibit you were --

12 MR. WITEK: Sure. It's Exhibit 1, the  
13 September 401 certification, and the SPLP work plan is  
14 attachment E, which I think is the very last attachment.

15 Q. Do you have it there?

16 A. I'm ready.

17 Q. So is it also your understanding that under the SPLP work  
18 plan, only one SPLP sample is required for each original  
19 screening sample that exceeds the criteria?

20 A. That's right.

21 Q. So if one original screening sample for a site over  
22 100,000 cubic yards exceeds the screening criteria, the  
23 site can be approved based upon a single SPLP test; is  
24 that right?

25 A. I don't know what you're talking about with 100,000 cubic

**AR 056723**

1 yards.

2 Q. Well, you're aware of the sampling requirements for the  
3 screening criteria under the 401 certification?

4 A. Yes. Could you point them out, please?

5 Q. Sure. I think we've referred to these before, and I  
6 think it's on page 16 of Exhibit 1.

7 A. Page 17?

8 Q. Seventeen I have is the actual fill criteria, and then on  
9 page 16 on Exhibit 1 there's a box down at the bottom of  
10 the page.

11 A. I gotcha.

12 Q. Okay. So this is the sampling that's required under the  
13 401; is that right?

14 A. It appears to be, yes.

15 Q. And so the way I understand it, if you have a site that's  
16 over 100,000 cubic yards, a minimum of six samples are  
17 required, and then if one of those fails the numeric  
18 screening criteria, the port's only required to do one  
19 SPLP test, and based upon the results of that test, the  
20 entire site can be approved for use; isn't that right?

21 MR. KRAY: Objection. Calls for a legal  
22 conclusion.

23 MR. WITEK: I am asking for her understanding.

24 MS. COTTINGHAM: Can you repeat the question.

25 Q. (Continuing By Mr. Witek): My question is, under the 401

**AR 056724**

1 certification, six screening samples are taken for a site  
2 over 100,000 yards under the chart on page 16.

3 MR. KRAY: Mr. Witek, you're asking for  
4 impression, correct?

5 MR. WITEK: That's right.

6 Q. And under the SPLP work plan, and I think you have  
7 already said that only one SPLP test is required for each  
8 failed sample. So my question is, is it your  
9 understanding that for a site over 100,000 yards, that  
10 you could have one SPLP test used to approve the entire  
11 site?

12 A. Can I tell you how I interpret it because I don't  
13 interpret it that way. Let's say you have greater than  
14 100,000 cubic yards and you tested a minimum of six  
15 samples but probably many, many more. So let's say you  
16 have tested six and five have passed for the criteria,  
17 but then one, one constituent of one sample doesn't pass,  
18 you run the SPLP, sure, you know, then you've got --  
19 yeah, that works.

20 Q. So when the SPLP testing is performed, it's only  
21 conducted for the chemical constituent that exceeds the  
22 criteria; is that right?

23 A. That's correct, because all the other criteria have  
24 passed.

25 Q. You talked about the biological opinion; is that right?

**AR 056725**

1 A. That's correct.

2 Q. Is there a difference between the types of metals  
3 addressed in the BO and the metals addressed in the 401  
4 certification?

5 A. Can you specify what you mean by types?

6 Q. Well, are there fill criteria in the 401 certification  
7 for metals for which there aren't limitations in the  
8 biological opinion?

9 A. The biological opinion specified a set of metals, and  
10 then when the 401 was issued, there's more metals that  
11 Ecology decided that they wanted sampled.

12 Q. I want to go back to attachment E, then, on page 3.  
13 Looking where it describes the screening procedure, and  
14 it says, "Results from the SPLP will be compared to fresh  
15 water ambient water quality criteria according to the  
16 guidelines outlined in WAC 173-201A-040." Do you see  
17 that?

18 A. No, could you please tell me what page you're on.

19 Q. I'm on page 3 of attachment E and there's Roman Numeral 3  
20 "Screening Procedure" and that's the first sentence after  
21 the Roman Numeral 3.

22 A. Okay. I'm ready. Could you repeat your question.

23 Q. Sure. Why don't we take a look at WAC 173-201A-040. I  
24 think that is Exhibit --

25 MR. REAVIS: Did you say 9?

**AR 056726**

1 MR. WITEK: I think it's 5.

2 Q. Do you have Exhibit 5?

3 A. I do.

4 Q. Do you see where all the tables start on Exhibit 040? I  
5 have a page 481 in the bottom right-hand corner on my  
6 copy.

7 A. Got it.

8 Q. So are these the criteria referenced in the SPLP work  
9 plan?

10 A. Yes.

11 Q. So would you agree that antimony, beryllium and thallium  
12 are all constituents for which sampling are required  
13 under the 401 certification?

14 A. Yeah, and we developed criteria for them that weren't  
15 here, we developed alternative criteria.

16 Q. All right. I'm going to ask that you answer my question,  
17 okay. So my question is, are there standards for those  
18 constituents on this table?

19 A. No.

20 Q. So there's no water quality standard in 040 for antimony,  
21 is there?

22 A. No.

23 Q. And there isn't one for beryllium or thallium?

24 A. No.

25 MR. JENSEN: What was the last one?

**AR 056727**

1 MR. WITEK: Thallium, T-H-A-L-L-I-U-M.

2 MR. JENSEN: Thank you.

3 Q. (Continuing By Mr. Witek): I think in your testimony  
4 earlier, and also in your prefiled, you talk about ultra  
5 clean fill?

6 A. That's true.

7 Q. Is that a term of art in risk assessment?

8 A. No, it's a term that the Fish & Wildlife Service  
9 developed.

10 Q. So that ultra clean fill that's -- can we put figure 2  
11 back up?

12 A. Sure.

13 Q. I can get it for you. So where is the ultra clean fill  
14 on that figure 2?

15 A. It's what we call the drainage layer or the wedge.

16 Q. And is it your understanding that under the 401  
17 certification that the ultra clean fill can contain  
18 gasoline, diesel and heavy oil?

19 A. The way that we wrote the -- the way that the Fish &  
20 Wildlife Service wrote for the drainage layer cover, it  
21 was a narrative standard for TPH, and the reason why is  
22 because when the BO was released, that was in May, and we  
23 knew that MTCA was about to come out with a new  
24 regulation in August, so we created a narrative standard  
25 for TPH in the drainage layer cover awaiting the new

**AR 056728**

1 regulations which were about to be published a few months  
2 later.

3 Q. So my question is, can that ultra clean fill include  
4 gasoline, diesel and heavy oil?

5 A. The ultra clean layer can contain TPH that is protective  
6 of water quality receptors. They could be naturally  
7 occurring.

8 Q. Ms. Gould, can I ask that you just answer my question,  
9 and if there's something additional that you have to say,  
10 your counsel can bring it up on redirect.

11 You testified earlier about testing for TPHs and  
12 picking up sort of, I guess, natural stuff, is that  
13 right.

14 A. (Nods head affirmatively).

15 Q. Now, are gasoline, diesel and heavy oil naturally-  
16 occurring substances?

17 A. Yeah, that's why you can dig them out of the earth, pump  
18 them up, and that's why we use them.

19 Q. In refined form?

20 A. Some are refined, some are not.

21 Q. Gasoline?

22 A. Gasoline is refined. Gasoline has a criteria of 30  
23 milligrams per kilogram.

24 Q. So is gasoline a naturally-occurring constituent?

25 A. Once it's refined, but it's still natural.

**AR 056729**



1 MR. WITEK: That's all I have for now.  
2 MS. COTTINGHAM: Mr. Poulin.  
3 MR. POULIN: No questions from CASE.  
4 MS. COTTINGHAM: Any redirect?  
5 MR. REAVIS: Just a couple of questions.  
6

7 EXAMINATION

8 BY MR. REAVIS:

9 Q. When Mr. Witek was asking you about the antimony,  
10 beryllium and thallium and whether those were in the  
11 table, and then you started to answer something about  
12 deriving those. Can you tell us what you actually did?

13 A. Yeah, I can. Let's see, Fish & Wildlife Service have  
14 there are own criteria which are developed for other  
15 criteria besides what's in 201A, and so it made a whole  
16 lot of sense for me -- and their criteria comes from the  
17 EPA, so I basically adopted those EPA criteria when I was  
18 back calculating these concentrations. And then Dr.  
19 Wisdom from Parametrix also calculated numbers for us  
20 which we used and which we would use to analyze for the  
21 SPLP test.

22 MR. REAVIS: Ms. Cottingham, I'd like to get  
23 back to these questions that Mr. Witek objected to  
24 earlier, because the questions I was going to ask  
25 relative to Mr. Kmet dealt with sampling. Mr. Witek has

**AR 056730**

1 asked this witness about sampling. I think that whatever  
2 objection to sampling testimony that ACC has has been  
3 waived because they brought the subject up and I'd like  
4 to ask her some questions about sampling protocols.

5 MR. WITEK: Ms. Cottingham, I think the board  
6 has already ruled on this issue.

7 MS. COTTINGHAM: I'm going to allow the  
8 redirect within the scope, the narrow scope of his cross  
9 examination on sampling.

10 Q. (Continuing By Mr. Reavis): I'm trying to remember the  
11 scope of his question. But are there recommendations in  
12 MTCA for sampling protocol?

13 MR. WITEK: Objection, outside the scope. All  
14 I did was talk about the table that's on page 16 of the  
15 401 certification.

16 MR. REAVIS: I guess I think it's hard to  
17 separate out. We have been talking about, you know, MTCA  
18 regulations, sampling, it's kind of hard to just take a  
19 narrow slice of that and ask this witness questions and  
20 not allow her to explain her position on sampling. We're  
21 trying to stay within the scope of direct, but,  
22 unfortunately, I think it's leaving a misimpression of  
23 what this witness's testimony is about sampling protocol.

24 MR. WITEK: Ms. Cottingham, if the argument  
25 here is that I opened the door, I would like to point out

**AR 056731**

1 that the door I have opened is very narrow.

2 MS. COTTINGHAM: I agree that the questioning  
3 is very narrow. He asked about the sampling table, he  
4 asked about antimony, beryllium, thallium, so if you can  
5 keep it narrow within those, and her responses to those  
6 questions.

7 MR. REAVIS: I think my questions go beyond  
8 that, so that's all the questions I have.

9 MS. COTTINGHAM: Mr. Kray.

10 MR. KRAY: No questions.

11 MS. COTTINGHAM: I have one question.

12

13

EXAMINATION

14 BY MS. COTTINGHAM:

15 Q. I want to make sure I captured this right, I didn't catch  
16 it the first time, but I filled in a blank here. You  
17 said the port is not required to do the SPLP unless one  
18 sample fails the numeric fill criteria, is that how  
19 you --

20 A. Maybe I should rephrase it because I'm not sure I said it  
21 right. If you're sampling a whole bunch of samples and  
22 they all pass, but one sample fails because it fails one  
23 of these criteria, we then run an SPLP on that criteria.  
24 If that SPLP fails, we submit it to Department of Ecology  
25 and a decision is made by Department of Ecology whether

**AR 056732**

1 that fill is rejected. Did I answer your question?

2 Q. I'm not sure I asked that question, but you answered a  
3 related question.

4 Any other questions?

5 MR. LYNCH: No questions.

6 MR. JENSEN: No.

7 MS. COTTINGHAM: Any questions as a result of  
8 board's questions?

9 MR. REAVIS: I don't have any.

10 MS. COTTINGHAM: Thank you. You're excused.

11 MR. REAVIS: The port's next witness is Beth  
12 Clark.

13

14 ELIZABETH CLARK, having been first duly sworn on oath or  
15 affirmed to tell the truth, the whole truth and nothing  
16 but the truth, testified as follows:

17

18 EXAMINATION

19 BY MR. REAVIS:

20 Q. Could you please state your name for the record.

21 A. Elizabeth Clark.

22 Q. Miss Clark, how are you currently employed?

23 A. I am a consultant to the Port of Seattle.

24 Q. Are you a port employee?

25 A. No, I am not.

**AR 056733**

1 Q. What exactly do you do for the port currently?

2 A. I oversee phase I and phase II environmental site  
3 assessment for the new property acquisitions for the Port  
4 of Seattle. I oversee the coordination of the  
5 environmental suitability review of incoming fill in  
6 accordance with condition E of the 401 certification. I  
7 am also involved in various site investigations and  
8 oversight of various site cleanup actions at the airport.

9 Q. And a copy of your CV was attached to your prefiled  
10 testimony; is that correct?

11 A. That's correct.

12 Q. Can you just give us a brief summary of your educational  
13 background.

14 A. I have a bachelor's and a master's degree in geological  
15 engineering, and I am a licensed civil engineer in the  
16 state of Washington.

17 Q. And did you used to work as an employee for the port?

18 A. Yes, I did.

19 Q. What did you do before working for the Port of Seattle,  
20 just briefly, your employment background?

21 A. I was employed for eight years in a consulting firm, and  
22 I was responsible for overseeing and managing  
23 environmental site investigation and cleanup activities  
24 at sites throughout the Puget Sound. Subsequent to that,  
25 I was environmental manager with the Port of Tacoma.

**AR 056734**

1 Q. Now, let me ask you, do you have a role with regard to  
2 implementation of the fill criteria set forth in the 401  
3 certification?  
4 A. I am responsible for coordinating the environmental  
5 suitability reviews that are in condition E(1) of the 401  
6 certification.  
7 Q. Where does the port get the fill that's coming from off  
8 site off of the port's property?  
9 A. From contractors.  
10 Q. Are you involved in the process of hiring those  
11 contractors?  
12 A. No, I'm not.  
13 Q. Are you involved in developing specifications for the  
14 bids for that work?  
15 A. Yes, I am.  
16 Q. Can you tell us whether you have prepared bid  
17 specifications in the course of that work?  
18 A. Yes, I have.  
19 Q. Can you tell us what's in those bid specifications in  
20 terms of the limit for TPH contamination?  
21 A. In the specifications I have put a limit of 460 ppm for  
22 total petroleum hydrocarbons.  
23 Q. Is there some sort of, not magic, but where does the 460  
24 number come from?  
25 A. The 460 number is the more conservative criteria that are

**AR 056735**

1 present in the 401 certification, and my understanding is  
2 that is based on ecological criteria.

3 Q. Now, how many sites have you accepted fill from since the  
4 September 401 certification was issued?

5 A. Seven.

6 Q. And have you listed each of those sites in your prefiled  
7 testimony?

8 A. Yes, I have.

9 Q. Can you tell us how many of those sites met the  
10 requirements contained in the 401 certification?

11 A. All of those sites.

12 Q. Now, before the 401 --

13 MR. STOCK: I'm sorry, I did not hear her  
14 answer.

15 THE WITNESS: All of those sites.

16 MR. STOCK: Thank you.

17 Q. (Continuing By Mr. Reavis): Before the 401 certification  
18 was issued, were you responsible for environmental review  
19 of the proposed third runway fill?

20 A. Since 1999, yes.

21 Q. Now, were there standards in place governing that fill  
22 that was imported prior to the 401?

23 A. Yes, there was a 1998 and a 1999 fill acceptance  
24 agreement.

25 MR. REAVIS: And those I believe we have marked

**AR 056736**

1 as Exhibit 1003 - I think we have multiple numbers -  
2 285 and what's the other number?

3 MR. JENSEN: 285?

4 MR. REAVIS: It's 285 and 286.

5 MS. COTTINGHAM: And 286?

6 MR. REAVIS: Correct.

7 Q. Could you just take a look while everybody is getting  
8 their copies out of Exhibits 285 and 286 and familiarize  
9 yourself with those. Do those appear to be the  
10 agreements that you referred to that govern imported fill  
11 prior to issuance of the 401?

12 A. Yes.

13 Q. Now, in the course of your work, then, regarding  
14 suitability of fill before the 401 was issued, did you  
15 rely on these agreements?

16 A. Yes, I did. I relied on the 1999 agreement and I had  
17 reviewed material developed prior to that time, and my  
18 understanding is the port was implementing the 1998  
19 agreements for that material.

20 Q. Now, do you know who was involved in agreeing to these  
21 particular numbers, the port and --

22 A. And Ecology.

23 Q. Without going into a lot of detail about this, can you  
24 give us just the highlights of what the primary  
25 restrictions on imported fill were under these two

**AR 056737**



1 agreements?

2 A. Similar to the 401 certification, the process included a  
3 review of current and past site history as appropriate,  
4 it required site sampling, and then a comparison of those  
5 sampling values to numerical criteria, but, in this case,  
6 it was the method A values.

7 Q. Now, to your knowledge, was all of the fill from sources  
8 imported prior to the 401 certification consistent with  
9 the requirements of these two agreements?

10 A. Yes, with one exception.

11 Q. And what is that exception?

12 A. The Black River Quarry.

13 Q. And have you described the Black River Quarry in your  
14 prefiled testimony?

15 A. Yes, I have.

16 MR. REAVIS: That's all I have. Thank you.

17 MS. COTTINGHAM: Mr. Kray.

18 MR. KRAY: Nothing for Ecology, Your Honor.

19 MS. COTTINGHAM: Cross examination?

20 MR. STOCK: Yes.

21

22 EXAMINATION

23 BY MR. STOCK:

24 Q. Miss Clark, Kevin Stock for ACC. I want to go back to  
25 the answer that you gave that I didn't hear, and that

**AR 056738**

1 was, did you say all of the sites, the seven sites from  
2 which the port is currently importing fill, you reviewed  
3 and those sites have met the 401 criteria?  
4 A. In my opinion, yes.  
5 Q. I want to refer you to Exhibit 294. Can you tell us what  
6 Exhibit 294 is, please?  
7 A. Exhibit 294 is a report prepared by Hart Crowser, the  
8 third runway project off site borrow source baseline  
9 chemical characterization for the Black River Quarry.  
10 Q. And you used this report to make your recommendation to  
11 the port that fill from the Black River Quarry be  
12 accepted for importation to the third runway site; is  
13 that correct?  
14 A. This was one of the reports that I used.  
15 Q. Turn to page 2 of the report, under "Chemical Analysis  
16 Results and Conclusions," do you see that?  
17 A. Yes.  
18 Q. And it's true, isn't it, that with respect to samples  
19 taken from the Black River Quarry, that chromium  
20 concentrations from two samples exceeded the chromium  
21 fill criteria set out on page 17 of the 401  
22 certification?  
23 A. That chromium exceeded for two?  
24 Q. Yes.  
25 A. I would have to --

**AR 056739**

1 Q. If you want, it might be easier to read table 1 of  
2 Exhibit 294, which is right after page 6. And at the top  
3 of that table, the first column --  
4 A. Yes.  
5 Q. -- sets out the screening levels contained in the 401  
6 criteria; is that right?  
7 A. Right. And so for chromium there were two values that  
8 exceeded the criteria for the wedge or the drainage layer  
9 cover.  
10 Q. And with respect to copper, all six samples from the  
11 Black River Quarry exceeded the numeric criteria set out  
12 in the 401 certification; isn't that right?  
13 A. For total metals, correct.  
14 Q. And the only reason that you went ahead and accepted the  
15 material from the Black River Quarry was because the port  
16 then used an SPLP test procedure; is that right?  
17 A. That's correct.  
18 Q. And, in fact, that happened with the Kent Kangley site  
19 also?  
20 A. That's correct.  
21 Q. There were samples from the Kent Kangley site where the  
22 samples exceeded the numeric criteria on page 17 of the  
23 401 certification and the port used the SPLP procedure to  
24 overcome the numeric criteria in the 401 certification;  
25 isn't that right?

**AR 056740**

1 A. There were values for the Kent Kangley site that were  
2 above the numeric criteria for total metals.

3 Q. And the port used the SPLP procedure to go ahead and say,  
4 yes, we're going to accept fill from the Kent Kangley  
5 site even though that fill sample exceeded the numeric  
6 criteria on page 17?

7 A. The port utilized the SPLP testing in accordance with  
8 attachment E of the 401 certification.

9 Q. And, in fact, the next site, Marine View pit, the same  
10 thing happened?

11 A. That's correct.

12 Q. There were samples from the Marine View pit that exceeded  
13 the numeric criteria in the 401 certification and, again,  
14 the port used the SPLP procedure to overcome the numeric  
15 criteria in the certification, correct?

16 A. I'm not sure I would characterize it that way, but we did  
17 utilize the SPLP procedures.

18 Q. And then the port accepted that fill from the Marine View  
19 pit?

20 A. Yes, and we submitted that information to the Department  
21 of Ecology.

22 Q. And there was yet another site, wasn't there, where that  
23 happened and that was CIT pit number 3 where there were  
24 samples that exceeded the numeric criteria in the 401  
25 certification, and the port used the SPLP procedure yet

**AR 056741**

1           again to accept the fill even though the samples exceeded  
2           the numeric criteria in the 401 certification?

3    A.   So there was --

4    Q.   Is that right?

5    A.   That's correct.

6    Q.   All right.  So four out of the seven sites that are  
7           currently being used, samples exceeded the numeric  
8           criteria and were subsequently accepted with SPLP;  
9           correct?

10   A.   That's correct, the four out of seven exceeded the  
11          criteria which were developed based on background.

12   Q.   Let's talk about TPH.  Gasoline.  There's no naturally-  
13          occurring background levels for gasoline, is there?

14   A.   I am not prepared to talk about the naturally-occurring  
15          background values.

16   Q.   Well, based upon your professional experience as an  
17          environmental site investigator, and given all of your  
18          experience with respect to cleaning up sites, you agree,  
19          don't you, that there's no naturally-occurring background  
20          levels for gasoline?

21   A.   Again, I believe what Linn Gould was saying is that --

22   Q.   Well, I want your opinion, Ms. Clark.  Based upon your  
23          experience as an environmental site investigator, and  
24          based upon all of your clean-up experience, you agree,  
25          don't you, in your professional opinion, that there is no

**AR 056742**

1 naturally-occurring background level for gasoline?

2 A. The test that is used to --

3 Q. Please answer my question, Ms. Clark.

4 MR. REAVIS: I think she is trying to answer  
5 the question.

6 A. Because the test that is used to evaluate gasoline will  
7 pick up, in addition to gasoline, naturally-occurring  
8 constituents that will be quantified as gasoline.

9 Q. Please listen to my question and answer my question. I  
10 will make it a very simple question.

11 You agree, based upon your experience in cleaning up  
12 sites, that there is no naturally-occurring background  
13 level for gasoline?

14 A. If you're saying like there is a number that is  
15 calculated for the metals, no, there is not.

16 Q. And, in fact, diesel oil doesn't naturally occur in the  
17 environment, does it?

18 A. Well, again, I believe Ms. Gould was saying --

19 Q. I want your professional opinion, not what Ms. Gould was  
20 saying, I want your professional opinion.

21 A. My understanding is that naturally-occurring compounds  
22 can be quantified as diesel.

23 Q. Isn't diesel a refined petroleum?

24 A. Right, but naturally-occurring compounds -- diesel is a  
25 hydrocarbon, a multi-chained hydrocarbon. There are

**AR 056743**

1 naturally-occurring compounds, I understand, that will  
2 occur in the same range as the diesel will occur, and so  
3 it's very common at site investigations to get natural  
4 interferences with your gas, diesel or your heavy oil,  
5 and based on my experience, I have seen that at sites  
6 before.

7 Q. Well, I don't want to perpetuate this much further  
8 because of the clock, but let me see if I can get this  
9 agreement out of you. You agree, don't you, that  
10 gasoline doesn't naturally occur in the environment?

11 MR. REAVIS: Objection. I think that's been  
12 answered.

13 MR. STOCK: I asked a different question.

14 A. Gasoline is a refined product.

15 Q. And it does not naturally occur in the environment, does  
16 it?

17 A. No.

18 Q. Let's move on and talk about the sites from which TPH has  
19 been present and the port has imported from those sites.

20 The port's imported material from the Black River  
21 Quarry site, correct?

22 A. Correct.

23 Q. And the material that was imported contained TPH at some  
24 level, isn't that true?

25 A. There were some samples that did detect TPH.

**AR 056744**

1 Q. And that's also the case with the Summit Ridge site, the  
2 port imported material from the Summit Ridge site and the  
3 material from the Summit Ridge site contained TPH at some  
4 level, correct?

5 A. The material that contained TPH from the Summit Ridge  
6 site was removed from the third runway.

7 Q. That was 1500 tons, correct?

8 A. I don't recall the numbers.

9 Q. There was also material imported from the First Avenue  
10 Bridge site that contained TPH, correct?

11 A. Correct.

12 Q. And there was also material imported from lagoon number 3  
13 that contained TPH, correct?

14 A. That's correct.

15 Q. And the port also imported to the third runway site  
16 material from air field panel replacements concourse B  
17 material that contained TPH and put it at the third  
18 runway site; isn't that true?

19 A. Yes, and in all cases below the method A levels.

20 Q. And with respect to the south satellite terminal  
21 expansion project, the port again imported material from  
22 that project, put it on the third runway site, and that  
23 material contained TPH at some level, did it not?

24 A. Restate the project again.

25 Q. SSTEP, south satellite, that's how you put it in your

**AR 056745**



1 deposition.

2 A. That's correct.

3 Q. Turn to Exhibit 287, please. Now, you were formerly  
4 going by the name of Beth Doan, were you not?

5 A. That's correct.

6 Q. And this Exhibit 287 is a memo that you wrote to Paul  
7 Agid; is that correct?

8 A. That's correct.

9 Q. And Paul Agid works for the port?

10 A. That's correct.

11 Q. And the subject of this memorandum to Mr. Agid was the  
12 material that was ultimately imported to the third runway  
13 site from the Hamm Creek site?

14 A. That's correct.

15 Q. Go down to the second to the last paragraph on the first  
16 page under "Discussion."

17 A. Yes.

18 Q. You wrote, "Since the samples were composited over large  
19 areas and depths, there is a potential for hot spots to  
20 go undetected." Do you see that?

21 A. Yes, I do.

22 Q. And you wrote that, didn't you, because there's always  
23 the potential when you use composite samples, that hot  
24 spots in the fill will go undetected, isn't that true?

25 A. As I discussed, there's times when you would use

**AR 056746**

1 composite samples.

2 Q. And my question, Ms. Clark, is the reason you wrote that  
3 is when you use composite samples, there's always the  
4 potential for hot spots to go undetected; isn't that  
5 right?

6 A. And that's why I --

7 MR. REAVIS: Before she answered, I think she  
8 got out one word or two words before Mr. Stock  
9 interrupted her last time. I think we're having a little  
10 bit too much of cutting the witness off before she's even  
11 had a chance to determine whether or not she is  
12 responding to the question.

13 MS. COTTINGHAM: Be careful on talking over the  
14 witness.

15 MR. STOCK: As always.

16 MS. COTTINGHAM: And you're going to need to  
17 speak up. The microphone does not broadcast.

18 Q. (Continuing By Mr. Stock): You wrote that because you  
19 know that when you use composite samples, there's a  
20 potential for hot spots to go undetected; isn't that  
21 right?

22 A. I wrote that along with the clarification in the next  
23 sentence which discusses the Boeing study which  
24 specifically did look for hot spots.

25 Q. But the reason you wrote the hot spots sentence is

**AR 056747**

1 because composite samples leave the potential for hot  
2 spots to go undetected; isn't that right?

3 A. And I was clarifying for the port that --

4 Q. Well, I need an answer to my question. That's why you  
5 wrote that sentence; isn't that right"?

6 Q. And, again, the reason why I wrote this sentence  
7 following it was to explain that at this site there was a  
8 combination of sampling approaches that were used.

9 MR. STOCK: I don't have any further questions.

10 MS. COTTINGHAM: Mr. Poulin.

11 MR. POULIN: No questions from CASE.

12 MS. COTTINGHAM: Any redirect?

13 MR. REAVIS: I have a couple.

14

15 EXAMINATION

16 BY MR. REAVIS:

17 Q. Let me ask you about Black River Quarry, since it was  
18 raised, containing some TPH. Were you able in the course  
19 of your investigation of that site to determine where  
20 that TPH was coming from?

21 A. Yes, I was.

22 Q. And where was it coming from?

23 A. The Black River Quarry site is a commercial site that  
24 essentially takes native bedrock, crushes that bedrock  
25 and it's used for construction sites throughout the Puget

**AR 056748**

1 Sound. This Black River Quarry site is also the site of  
2 an asphalt-recycling operation. Now, that operation is  
3 separate from the rock-crushing operation, but it does  
4 use some common equipment. And as we began accepting  
5 material from the Black River Quarry, we were doing on-  
6 going TPH testing, and two out of the 14 samples we found  
7 had exceedances of the method A level for TPH. The  
8 value, the maximum value was 270 ppm which compares to a  
9 method A level of 200 ppm or the current method A level  
10 of 2,000 ppm.

11 We looked back and determined when those samples,  
12 what time those samples, material that represented, and  
13 what we found what was happening is if the quarry was  
14 blasting rock, then they switched to their asphalt-  
15 recycling operations and then went back to blasting rock,  
16 that the initial soil coming off the equipment was -- it  
17 was that soil that was containing these residual levels  
18 of heavy oil. And we determined that that was  
19 attributed, therefore, to essentially not completely  
20 cleaning out their equipment.

21 When we found this out, we stopped, discontinued  
22 haul from the Black River Quarry and went to the operator  
23 and had them evaluate their operations. And what they  
24 did specific just for the Port of Seattle was to make a  
25 modification in their operation such that whenever there

**AR 056749**

1 was a switch in equipment, that they would more  
2 thoroughly clean the equipment and that the first 100  
3 tons of soil would be discarded and not brought into the  
4 third runway. They then did testing to see if that was  
5 going to be sufficient and in all cases, then, the levels  
6 of TPH were reduced, and that seemed to be an effective  
7 way to address this incidental asphalt that seemed to be  
8 mixing in with the rock material.

9 Q. Now, this rock material that's being blasted out, is that  
10 naturally-occurring uncontaminated soil?

11 A. Naturally-occurring rock, yes.

12 Q. Now, how does the rock get from the pit to the third  
13 runway site?

14 A. It is loaded into trucks.

15 Q. What do those trucks run on?

16 A. Run on diesel.

17 Q. Okay. Let me ask you about Summit Ridge. Mr. Stock  
18 asked you a question about material being brought in to  
19 the embankment from Summit Ridge, and I think you  
20 answered, I'm not sure if you completed your answer, but  
21 what happened to that material?

22 A. Essentially, while they were excavating at the Summit  
23 Ridge site, the contractor noticed that there was a  
24 petroleum odor. They called their environmental  
25 consultant who came on board and said it looks like we

**AR 056750**

1 have encountered a home eating oil tank. They notified  
2 the Port of Seattle and we immediately stopped accepting  
3 material from that site. They had been hauling for about  
4 one day from that site. So the question then arose was  
5 there a potential that some of the material that already  
6 came in was impacted by that petroleum. And we evaluated  
7 the situation to determine whether we should go back in  
8 and test the material that was already placed, and the  
9 port made the decision in cooperation with the contractor  
10 that it was just as simple to remove all material from  
11 that full day's worth of haul rather than to go back and  
12 do extensive sampling of that.

13 Q. Let me ask you about Hamm Creek then and this issue of  
14 hot spots. I think you were describing the sentence  
15 after the one that Mr. Stock was reading to you about the  
16 Boeing study. Can you elaborate on that a little bit and  
17 tell us what the Boeing study added to your evaluation of  
18 that site?

19 A. The Boeing Company did a phase I/phase II site assessment  
20 on this property. So they looked very carefully to  
21 determine where there were areas of potential  
22 environmental concerns. And they tested in areas very  
23 specific, very specific areas to address and to look and  
24 see if there was any soil that would be impacted.

25 Q. Now, with regard to these questions about whether

**AR 056751**

1 gasoline or diesel is naturally occurring, I think you  
2 were starting to describe --

3 MR. STOCK: This is leading.

4 MR. REAVIS: I'm trying to shortcut and get her  
5 into the topic.

6 MR. STOCK: I would ask that Mr. Reavis just  
7 ask direct questions instead of setting the question up.

8 MS. COTTINGHAM: Ask it carefully.

9 Q. (Continuing By Mr. Reavis): Do you remember the  
10 questions you were asked about whether gasoline is  
11 naturally occurring?

12 A. Yes.

13 Q. What sort of analytical procedures were used typically to  
14 sample for the presence of gasoline and other petroleum  
15 hydrocarbons?

16 A. What the laboratory does is a method that will look at  
17 the -- TPH isn't a single compound, TPH is a combination  
18 of many different compounds. And so they will do a scan  
19 that will evaluate the presence of all, you know, within  
20 that range of compounds that gasoline would occur. And  
21 so my point is that gasoline will occur between a  
22 particular hydrocarbon range, but naturally-occurring  
23 substances will also occur within that hydrocarbon range.  
24 And so very often you will see that you will get, you  
25 know, these false indications of gasoline or something

**AR 056752**

1 being quantified as gasoline because naturally-occurring  
2 compounds are kind of overlapping what a gasoline scan  
3 would look like.

4 MR. REAVIS: That's all I have. Thanks.

5 MS. COTTINGHAM: Mr. Kray.

6 MR. KRAY: Nothing

7  
8 EXAMINATION

9 BY MS. COTTINGHAM:

10 Q. I have one question, and I didn't catch it because your  
11 voice dropped off. You were talking about the off-site  
12 fill from contractors. You said there were limits on,  
13 and I think you said P-P-L. I probably missed that.

14 MR. STOCK: I think -- I don't mean to testify,  
15 but I think she said TPH.

16 MR. REAVIS: I'm not sure --

17 A. Are you talking about the specifications that we  
18 developed?

19 Q. You said limits on, and then the next sentence was for  
20 460.

21 A. Yes. So in the specifications we have included the Fish  
22 & Wildlife Service criteria in the 401 certification  
23 criteria. As you are aware, in the 401, the criteria is  
24 2,000 ppm for --

25 Q. That's it, ppm.

**AR 056753**



1 A. Parts per million for TPH. What we use was 460 instead  
2 of the 2,000 number.

3 MS. COTTINGHAM: Thank you. Any other  
4 questions?

5 MR. LYNCH: No questions.

6 MR. JENSEN: No questions.

7 MS. COTTINGHAM: Any questions as a result of  
8 the minor board question?

9

10 EXAMINATION

11 BY MR. STOCK:

12 Q. Just for clarification, ppm, or parts per million, is the  
13 same as milligrams per kilogram?

14 A. That's correct.

15 MS. COTTINGHAM: You're excused. I'm going to  
16 suggest we take about a 10-minute break.

17 (Whereupon, a recess was taken.)

18 MR. REAVIS: The port calls Dr. Mike Riley.

19

20 MICHAEL RILEY, Ph.D., having been first duly sworn on  
21 oath or affirmed to tell the truth, the whole truth and  
22 nothing but the truth, testified as follows:

23 ////

24 ////

25 ////

**AR 056754**

1 EXAMINATION

2 BY MR. REAVIS:

3 Q. Please state your name for the record.

4 A. Michael Riley.

5 Q. And how are you currently employed?

6 A. I am an employee of S. S. Papadopoulos & Associates.

7 Q. And what sort of firm is that?

8 A. We are primarily a groundwater modelling/water resources  
9 analysis firm.

10 Q. Could you give us a brief run down of your educational  
11 background, please?

12 A. I have a bachelor's in history and a bachelor's in civil  
13 engineering and a Ph.D. in civil engineering with a  
14 specialty in water resource engineering and sub program  
15 called water quality hydrodynamics.

16 Q. Okay. Now, how long have you been engaged in civil  
17 engineering, specifically hydrogeology?

18 A. Well, civil engineering since 1980, more and more in  
19 hydrogeology since the late 1980s.

20 Q. Okay. Since you got your Ph.D., how have you been  
21 employed?

22 A. Worked in Seattle area at Parametrix for a number of  
23 years, then I went to Papadopoulos & Associates in  
24 Washington, D.C.; came back to Seattle, worked for  
25 Converse Consultants; and then went back to Papadopoulos

**AR 056755**

1 in Boulder, Colorado; and then returned here about four  
2 years ago, opened an office here for Papadopoulos.

3 Q. And here is?

4 A. Olympia, Washington.

5 Q. Can you tell us what work you have been asked to perform  
6 with regard to the third runway project?

7 A. We were asked two different things. One, started out  
8 reviewing the work by Pacific Groundwater Group. Since  
9 we are a groundwater modelling firm, the port was looking  
10 to an outside peer reviewer to evaluate Pacific  
11 Groundwater's work. And then secondary to that, which  
12 actually became larger piece of the work, was to do a  
13 water quality model of the embankment looking at what  
14 concentrations might be expected to discharge out of the  
15 embankment.

16 Q. Concentrations of?

17 A. Metals, several organic compounds, including TPH  
18 compounds, DDT compounds and PCBs.

19 Q. Now, is your work summarized in a document?

20 A. Yes, it is.

21 Q. And I believe you have it there in front of you, it's  
22 Exhibit 1320?

23 A. Yes, this looks like our document.

24 Q. Now, can you just describe for us generally what type of  
25 work you were doing and the scope or the areas that you

**AR 056756**

1 have laid out for us?

2 A. Well, in the review of Pacific Groundwater Group's work,  
3 we actually obtained their input files and, in  
4 particular, one of their Slice models, which was a spread  
5 sheet model, and then we reviewed what work they had done  
6 in setting up those two models.

7 Q. Let me stop you there so it's clear for everybody.  
8 Pacific Groundwater is Mr. Ellingson who was here today?

9 A. Right, right. So we reproduced the Slice model with  
10 different models. Since their model was proprietary, we  
11 felt we had to verify it using a different approach. So  
12 we constructed a similar version of their model but a  
13 modflow, which is a public domain program. And we did  
14 run into some of the limitations that one would  
15 anticipate in using the modflow program, but we do have  
16 in-house versions of modflow that allow us to get around  
17 some of those problems.

18 In doing that, we were able to verify that their  
19 results were reasonable.

20 Q. And what's the name of the model that you used for the  
21 purpose of reviewing the PGG work?

22 A. It was the modflow, USGS modflow program.

23 Q. Okay. I notice in your report you refer to VS2DT?

24 A. VS2DT.

25 Q. Right. Can you tell me what that is?

**AR 056757**

1 A. That stands for variably saturated two-dimensional  
2 transport, and that's the model that we set up for doing  
3 the transport of water quality dissolved substances out  
4 of the embankment.

5 Q. And what were you attempting or what questions were you  
6 attempting to answer by using that model?

7 A. We were trying to find if the port could expect water  
8 quality exceedances in the material discharging from the  
9 embankment.

10 Q. Can you provide us then a brief description of how you  
11 performed that particular modelling task.

12 A. I'll refer to this for some of our figures.

13 Q. Are these figures contained in your report?

14 A. Yes, they are. So, in fact, the figure is at the bottom,  
15 the figure number is at the bottom, too, so these are  
16 actually reproductions from our report. And this I  
17 believe you saw when Linn put up the same figure. And  
18 this is what we start is the conceptual understanding of  
19 what the area looks like. This is a cross-section  
20 through the fill. And when you say a two-dimensional  
21 model, it means you're only working, in this case, just a  
22 horizontal and vertical direction. So we took a model  
23 that takes a slice through the fill, and when you do  
24 that, you come out with something that looks like this.  
25 And in making a model, you have to basically grid the

**AR 056758**

1 whole thing, so each one of these little points in here,  
2 each one of these rectangles gets a series of values,  
3 including hydraulic conductivity that Pony spoke about,  
4 initial concentrations, initial soil moisture, which was  
5 an issue of debate earlier today, too.

6 So then this model is basically just turned on with  
7 recharge coming in at the surface and monitor what the  
8 model predicts what's coming out down here at the end of  
9 the drainage layer.

10 Q. Now, you've talked in your prefiled testimony about a  
11 number of parameters for the model. I don't want to go  
12 into all of those, but can you explain for us what the  
13 parameter called KD is?

14 A. KD, that's just coefficient that refers to how a  
15 substance will partition between a solid phase, such as  
16 attached to soil, and in the dissolved phase. So if you  
17 take the ratio of the concentration in the solid and  
18 divide by the concentration that leached off of that  
19 solid, that would be your KD. So it's just a  
20 partitioning.

21 Q. What's the significance of that variable?

22 A. In this case, it has two significances. The first one is  
23 that it defines what the concentration is that you would  
24 be starting with in the model, because you have soil with  
25 some amount of, say, some amount of metals in the soils,

**AR 056759**

1 and then based on that, what amount would be in the water  
2 that's in contact with that soil.

3 Then the second part of it is as the metals start to  
4 move from one type of soil to another, that parameter  
5 defines whether or not it will bind up with that other  
6 soil.

7 Q. Is that the globbing on again?

8 A. Well, globbing is a little too strong of a term, but --

9 MR. WITEK: Then I object.

10 [Laughter]

11 Q. (Continuing By Mr. Reavis): Now, what model inputs did  
12 you use then for the concentrations of chemicals in the  
13 embankment?

14 A. Within the embankment, we took the fill criteria and  
15 using the partitioning, we calculated an initial  
16 concentration in the water phase all through here. Now,  
17 the solid phase, what's on the soil, would be what's in  
18 the criteria. And then through here, the bottom, the  
19 drain layer, we took that as actually taken SPLP testing  
20 that we had done specifically on some drain layer  
21 material. And then this area here was also considered  
22 part of the drain layer material because this is, again,  
23 ultra clean stuff.

24 Q. Now, with regard to the specific numeric criteria, then,  
25 how did you plug those into your model? I'm talking

**AR 056760**

1 about the numeric criteria contained in the 401  
2 certification. What numbers did you use for your model?  
3 A. Well, there's two tables or two columns on the table. We  
4 used the higher of the two for what we call the general  
5 fill in our report.  
6 Q. So did you use the minimum amount, the maximum amount, or  
7 how did you go about selecting what number to use for the  
8 table?  
9 A. Just the higher of the two.  
10 Q. Now, there's been some questions raised in this case  
11 about fill accepted prior to the date the 401 was issued.  
12 Did you perform any modelling to determine whether or not  
13 that has any risk to water quality?  
14 A. Yes, we did.  
15 Q. Can you describe that for us?  
16 A. What we did is actually took -- had a site tour and we  
17 went out and looked at the areas where some of this  
18 material was deposited, and then we made two versions of  
19 the same model. This one here shows where the Black  
20 River Quarry and First Avenue Bridge material is disposed  
21 up in kind of the higher more eastern end of the  
22 embankment. And then the second one we did --  
23 Q. Before you move that, can you tell us is that outlined in  
24 red there?  
25 A. Yeah, the red area in here. Then what we did is we had a



1 number of sample results, we had the sample results from  
2 the First Avenue Bridge construction project and we also  
3 had the sample results from Black River Quarry. And the  
4 highest value was 270 milligrams per kilogram for TPH.

5 Rather than trying to make a distribution through  
6 here, saying some of this is clean, some of this is  
7 dirty, we just took that highest concentration and  
8 applied it to the entire fill, very much a worse-case  
9 kind of analysis.

10 Q. So then I think I interrupted you when you were switching  
11 cards there.

12 A. So when we saw where the Hamm Creek material was being  
13 deposited or had been deposited, we realized that it was  
14 actually more out towards the end of what would become  
15 the future embankment. Here the issue were DDT compounds  
16 and PCBs. And within that class of compounds, the worse  
17 concentration was actually for a compound that's a  
18 breakdown compound of DDT called DDD.

19 So we took this entire fill as being that highest  
20 concentration of DDD that we had from lab results, and  
21 similarly, we took the PCB concentration for the highest  
22 PCB that was detected. And, again, the whole fill was  
23 treated as being that highest concentration.

24 Q. Okay. Now, maybe you should stay standing for a minute.  
25 I wanted to ask you what were the results of your

1 modelling and if there's some table that reflects the  
2 results.

3 MR. WITEK: Objection. We just wanted to note  
4 our continuing objection because this is a post February  
5 1 planning report, and I recognize that you ruled on that  
6 earlier in our motion in limine. I just wanted to note  
7 our objection for the record.

8 MS. COTTINGHAM: It was post February 1st but  
9 before February 28th or --

10 MR. REAVIS: Correct. There's been an order  
11 entered I think on this issue.

12 MS. COTTINGHAM: Okay.

13 A. In terms of results, we ran the case of metals out of the  
14 general fill. And so we have the maximum predicted  
15 discharge over a model simulation of 1,000 years. And  
16 compared then the highest concentration that we're  
17 predicting coming out of the fill to what we call the  
18 threshold values which are a combination of either  
19 ambient water quality criteria or what was mentioned  
20 earlier today was Charlie Wisdom of Parametrix had done  
21 some analysis to say what thresholds might apply to some  
22 compounds that don't have water quality criteria, they're  
23 not in the ambient water quality table. So these are a  
24 combination of those. As you can see in all cases, we're  
25 well below the applicable concentrations for all of the

1 metals.

2 Then we ran one special or two special cases  
3 involving arsenic. And in this case what we did is we  
4 took our most conservative transport parameter, being the  
5 KD value, and we gave it the lowest number, which means  
6 that we make something more transportable, and then we  
7 took the fill criteria and instead of doing 20 milligrams  
8 per kilogram, we raised it to first 100 and then to 200  
9 and we ran it again and we found that there was actually  
10 no change with that. Those were actually relatively small  
11 changes in both parameters with respect to the way the  
12 embankment functions.

13 Q. So what does that tell you then, that sensitivity  
14 analysis?

15 A. Well, overall, it tells you if you made changes in the  
16 model, if somebody disagreed with you in terms of, oh,  
17 you should have used a higher hydraulic conductivity or  
18 you should have had more water passing through the  
19 system, that your results really won't change based on  
20 small changes in the model setup.

21 Then, in terms of the organic compounds, we have  
22 Hamm Creek, and we ran DDD and PCB, Arochlor 1254, and in  
23 both of those cases -- and this was actually no surprise  
24 to us because these compounds adsorb very strongly to  
25 soils, and, consequently, we don't see any movement being

**AR 056764**

1 predicted in these compounds over a thousand years. The  
2 First Avenue Bridge/Black River Quarry material, here we  
3 are going to get back to that TPH issue that we had  
4 earlier, what is TPH. Well, it's a whole set of ranges  
5 of carbon chains. So we had to break that down because  
6 we can't actually model a whole host of compounds, so  
7 what we did is we broke it down into these different  
8 ranges: 10 and 12 carbon, 12 to 16, 16 to 21, and 21 to  
9 34 we looked at, but by the time we'd gotten down this  
10 far, we realized that nothing was being transported.

11 So we started out with an existing concentration  
12 then for something in this range of carbon. And this is  
13 why TPH is such a hard thing to work with because the TPH  
14 test doesn't really tell you what's there, it just tells  
15 you that there's something there. So we had to break  
16 this down based on some Department of Ecology  
17 recommendations on the type of compounds you get in heavy  
18 oil, because that's what was detected here were heavy  
19 oils. We ran that out for 1,000 years, and the lighter  
20 phase, the lightest phase material we did see some  
21 movement in it. It does come out, but it comes out well  
22 below a water quality criteria for naphthalene, which is  
23 a substance that falls within this range.

24 Similarly, we saw some movement of the next heavier  
25 range of carbons, but, again, much less than the

**AR 056765**

1 acanaphthalene, which is a typical compound for that  
2 range. And then as we get into heavier carbon ranges,  
3 there is less movement, and so you see this starts to  
4 drop off and then by that time, it's pretty much just  
5 done.

6 Q. Based upon those results, do you have an opinion about  
7 whether the numeric fill criteria in the 401  
8 certification are protective of water quality?

9 A. Yes, I do.

10 Q. And what is that?

11 A. It looks very protective to me.

12 Q. Now, did your model account for all of the natural  
13 processes that could affect these concentrations?

14 A. We limited the modelling to just within the embankment,  
15 so there are processes that when you are looking at water  
16 quality impacts to the stream, we did not actually carry  
17 these out to the stream. For one, we didn't have to  
18 because if it's already coming out, no need to make a  
19 more complicated model already -- it's complicated enough  
20 as far as I'm concerned. And so we left out any mixing  
21 with ambient groundwater, anything that, any adsorption  
22 on to existing soils that the water was infiltrating  
23 through.

24 There's a number of other processes that were left  
25 out. That's why even this is a conservative evaluation.

**AR 056766**

1 Q. Okay. Now, have you read Dr. Lucia's prefiled testimony?  
2 A. Yes, I have.  
3 Q. And were you present when he testified last week?  
4 A. Yes, I was.  
5 Q. One of the concerns that he raised was the substitution  
6 of the wedge, I think he called it the sandwich, which  
7 basically includes a 6-foot layer of this ultra clean  
8 fill along the entirety of the bottom of the embankment  
9 and substituting in place of that the wedge. Do you  
10 remember that testimony?  
11 A. Right.  
12 Q. How did your model address protectiveness of that wedge,  
13 or does it address the protectiveness of the wedge?  
14 A. We had the wedge in there as a separate unit. And so  
15 anything in the general fill that starts to migrate has  
16 to migrate through the wedge before it gets down to the  
17 discharge point here. If the wedge wasn't there and this  
18 general fill extended down here, it would only have to  
19 migrate a relatively short distance to get out.  
20 So the wedge in this part of the model is very, very  
21 protective, was very protective towards the point of  
22 discharge.  
23 Q. And while you're up there, then, the other, I think, part  
24 of this concern was you have sort of eliminated that 6-  
25 foot layer uphill from the wedge there. Could you show

**AR 056767**

1 us where that would be?

2 A. Right here.

3 Q. Yeah. And under the original 401, where would that 6-  
4 foot layer have run?

5 A. Would have run just above the drainage layer here, which  
6 is just one cell wide, so if it would have went up like  
7 that, you see that we'd be beyond the wedge out here.

8 Q. Now, do you have an opinion as to whether or not  
9 elimination of that layer for the uphill portion is  
10 protective of water quality?

11 A. Well, the critical element here is how far, how long is  
12 this pathway as it's going down through here, so  
13 initially just the 6-foot layer here, from this point it  
14 would be six feet through the clean blanket and then into  
15 the drainage layer and then out. In this case, now we  
16 have several hundred feet, approximately 500 feet, before  
17 this can actually get out through this pathway. In one  
18 sense, it's less protective because this is now, instead  
19 of a 500-foot pathway, it would have before been a 506-  
20 foot pathway, so there is not really much protectiveness  
21 involved in that. Where the protectiveness really comes  
22 in is down here instead of having a only 6-foot pathway,  
23 now it has a 40-foot pathway, so more time for the metals  
24 to attach on to soil particles.

25 Q. Okay. Thank you. Now, let me switch gears then and talk

**AR 056768**

1 about the other part of your work, which I believe you  
2 described as a review of the PGG work, Pacific  
3 Groundwater work.

4 Can you describe what documents you reviewed in  
5 preparing that review?

6 A. I looked at -- I already had a copy of their earlier work  
7 for Department of Ecology, and then I obtained, I believe  
8 it was, an August 2001 document and then a second one,  
9 which was November 2001, I believe it was, and  
10 concentrated largely on the November 2001, because that  
11 was their final report.

12 Q. And do you have an opinion about whether the approach  
13 that Pacific Groundwater took to the modelling was  
14 appropriate?

15 A. Yeah, I think it was appropriate.

16 Q. Now, one other question about Dr. Lucia's testimony. Do  
17 you recall the figures that he had, the cross-sections of  
18 the embankment that were red and yellow?

19 A. Mm-hmm (witness nods head affirmatively, that Pony showed  
20 earlier?)

21 Q. Right. Do you have an understanding of what Dr. Lucia's  
22 concern is there?

23 A. Yes, I do.

24 Q. And do you agree with that?

25 A. No, I don't.

**AR 056769**



1 Q. Why not?

2 A. Well, it makes a number of assumptions that I don't  
3 really think are very realistic either for the  
4 construction project or for western Washington.

5 The construction project will take years to  
6 construct, and during the years of construction, it will  
7 be exposed to the elements, so it will be receiving water  
8 as any other part of western Washington receives water  
9 over a span of years.

10 Also, the initial way of establishing the soil  
11 moisture before he starts the model is what we would use  
12 in a desert climate, and that is to have the groundwater  
13 at the bottom of the model used to distribute soil  
14 moisture vertically all the way to the surface. When you  
15 don't have much in the way of rainfall, that's the sort  
16 of starting condition that you would have because you  
17 would be saying that most of your soil moisture is coming  
18 from groundwater. In western Washington, we know most of  
19 our soil moisture comes from rainfall.

20 So the difference in the approach between what  
21 Pacific Groundwater Group did and what Dr. Lucia did was  
22 much more realistic on the part of Pacific Groundwater  
23 Group and quite unrealistic on the part of Dr. Lucia.

24 Q. What about Dr. Lucia's criticism relating to the layering  
25 that would occur in the embankment and the effect of that

**AR 056770**

1 on transport of water through the embankment?

2 A. Well, we incorporated some of that into our modelling  
3 approach because we actually allowed more, a higher  
4 hydraulic conductivity in the horizontal direction, so in  
5 our modelling, the water has ten times less resistance to  
6 flow horizontally than vertically. But even with that  
7 difference, we were seeing very little movement along the  
8 face of the embankment.

9 Q. Okay. That's all I have. Thank you.

10 MS. COTTINGHAM: Mr. Kray.

11 MR. KRAY: No questions.

12 MS. COTTINGHAM: Cross examination.

13 MR. WITEK: Thank you.

14

15 EXAMINATION

16 BY MR. WITEK:

17 Q. Hi, Dr. Riley. I am Mike Witek for the Airport  
18 Communities Coalition.

19 A. Hello.

20 Q. Actually, could we go back to your figure 2.

21 A. Sure.

22 Q. So, as I understand it on your model, there are two basic  
23 components, there is the general fill and the type 1  
24 fill; is that right?

25 A. Correct.

**AR 056771**

1 Q. And the general fill, is that sort of, I guess, pinkish  
2 or salmon-colored layer?

3 A. Yes.

4 Q. And then the type 1 fill is the drainage layer cover, the  
5 face of the embankment and the actual drainage layer  
6 itself; is that right?

7 A. Correct.

8 Q. Okay. Do you have a copy of your report there?

9 A. Yes, I do.

10 Q. Can you turn to table 1.

11 MS. COTTINGHAM: Are you in his prefilled?

12 MR. WITEK: Exhibit 1320.

13 MR. KRAY: What page are you on?

14 MR. WITEK: Well, I'll tell you as soon as I  
15 get there.

16 Q. Have you found table 1 in your report? Can you tell us  
17 what page that's on?

18 A. It's not numbered.

19 Q. Okay.

20 MR. REAVIS: I believe it's the first table in  
21 there, about two-thirds of the way to the back.

22 MS. COTTINGHAM: Is that the table that  
23 follows figure 5?

24 THE WITNESS: Yes, it is.

25 MR. WITEK: That's the one I had in mind.

**AR 056772**

1 Q. So this table sets out the soil fill criteria, correct?  
2 A. Correct.  
3 Q. And as I look at this, the column all the way over on the  
4 right is the general fill criteria?  
5 A. Right.  
6 Q. And the criteria for the type 1 fill is the column that's  
7 just over on the other side of that?  
8 A. Right.  
9 Q. To the left. And footnote it looks like E or 3, actually  
10 I guess it's 3, says that these are the criteria from the  
11 401 certification?  
12 A. Attachment E.  
13 Q. Attachment E. So there are actually additional criteria  
14 in there for gasoline, diesel and heavy oil in attachment  
15 E, right?  
16 A. Correct.  
17 Q. Can you look at table 7 in your report, Exhibit 1320.  
18 That has discharge concentrations in it; is that right?  
19 A. Right.  
20 Q. Can you show me on figure 2 where the discharge  
21 concentration occurs, or if there's one of the other  
22 figures that's more appropriate to refer to, that's fine.  
23 A. This is fine. It's right at the toe of the slope.  
24 Q. Thank you. And while we're looking at figure 2, can you  
25 look at Exhibit 1178. The copy of it has a little tab

**AR 056773**

1           that says "Figures" and then I have a figure 3-5  
2           "Simplified West Wall Cross-Section for Modelling."  
3    A.    1178?  
4    Q.    That's right.  
5    A.    What page?  
6    Q.    I have just a tab I think after the report that says  
7           "Figures."  
8                    MR. REAVIS:  Ours don't have tabs.  
9                    MS. COTTINGHAM:  What is the figure number?  
10                   MR. WITEK:  It's figure 3-5 "Simplified West  
11           Wall Cross-Section for Modelling."  
12                   MS. COTTINGHAM:  It's a cross-section of the  
13           embankment so I can  --  
14                   MR. WITEK:  That's right, figure 3-5.  
15                   MS. COTTINGHAM:  Okay.  
16    Q.    (Continuing By Mr. Witek):  And this is the June 19, 2000  
17           PGG report, isn't it, Dr. Riley?  
18    A.    Which date did you say?  June 19, 2000?  
19    Q.    That's right.  
20    A.    Right.  
21    Q.    Okay.  
22    A.    The one prepared for Washington State Department of  
23           Ecology?  
24    Q.    That's right.  So looking at figure 3-5, you can see  
25           that's a schematic, I guess, similar to your figure 2; is

**AR 056774**

1       that right?

2    A.   It's a different section through the embankment.

3    Q.   And what's the layer below the embankment?  See where it

4       says slice and then it shows a layer that runs -- there's

5       an arrow pointing out the layer on figure 3-5.  Do you

6       see that?

7    A.   Are you reading it at the bottom of the page there?

8    Q.   I'm actually --

9    A.   Is it the one with the little stipple marks on it?

10   Q.   I guess I'm looking at the figure at the top of -- figure

11       3-5 has two figures, so I'm looking at the one at the

12       top.  I guess what I want to know is what is the layer

13       that's below the drainage layer on this?

14   A.   The one with the slice and the arrow in it?

15   Q.   That's right.

16   A.   That's native soil.

17   Q.   If you take a look at the key, doesn't that describe that

18       as till?

19   A.   The one with the slice and the arrow pointing

20       approximately 45 degrees down and to the left I think is

21       Qvr, isn't it, Vashon recessional.

22   Q.   I'm sorry, I'm asking about the layer that's under the

23       word "slice" on the figure at the top of figure 3-5, and

24       I think if you look at the key, I think you will agree

25       with me that that's --

**AR 056775**

1 A. Is that the one with the little hatch marks in it?

2 Q. That's described as Vashon till, isn't it?

3 A. Okay, I see what you are talking about. Okay.

4 Q. Is that till represented on your figure 2 that's up there  
5 on the board?

6 A. Yes, it is. It's the greenish layer.

7 Q. And those don't seem to be the same length, do they, from  
8 your figure to this figure 3-5; is that right?

9 A. We map them differently.

10 Q. So your figure on figure 2 you don't have the till going  
11 under the wall, do you?

12 A. Pardon me?

13 Q. I'm sorry. So on your figure 2, you don't have the till  
14 extending under the embankment wall, do you?

15 A. In this particular section it doesn't extend all the way  
16 out.

17 Q. I wanted to ask you about table 4 on your report, going  
18 back to Exhibit 1320.

19 A. Okay.

20 Q. So as I understand it, these are the initial conditions  
21 for the model; is that right?

22 A. The initial concentration conditions.

23 Q. So this is for soil and groundwater?

24 A. It is for the groundwater.

25 MR. REAVIS: Which table are we on?

**AR 056776**

1 MR. WITEK: Table 4 in Exhibit 1320.

2 Q. So if I am reading this right, it's got initial  
3 concentration in micrograms per liter on the far  
4 right-hand side; is that right?

5 A. Right.

6 Q. And then general embankment criteria is the set on the  
7 top, and then the type 1 fill is down below; is that  
8 right?

9 A. Correct.

10 Q. And as I understand it, the numeric criteria in the 401  
11 certification are stated in soil concentrations in  
12 milligrams per kilograms; is that right?

13 A. Correct.

14 Q. And so you have applied, for the general embankment fill  
15 criteria, you have used the soil concentrations from the  
16 401 and you have applied a KD value to it to come up with  
17 the initial concentration I guess in the liquid phase?

18 A. Correct.

19 Q. Should I use a different term for that?

20 A. No, that's one way of saying it.

21 Q. But you took a different approach for the type 1 fill,  
22 though, didn't you?

23 A. Yes, we did.

24 Q. So as I understand it, for the type 1 fill, the initial  
25 concentrations, those aren't based on the fill criteria

**AR 056777**



1       that are applicable, say, to the drainage layer cover,  
2       are they?

3   A.   No, they are not.

4   Q.   Instead, aren't they based on SPLP test results for the  
5       Kent Kangley site; is that right?

6   A.   Yes, they are.

7   Q.   Can you go to page 9 in your report, that's Exhibit 1320.

8   A.   Page 9?

9   Q.   That's right. I'm looking at a sentence, I think it's  
10       the second to the last sentence on the page, and it says,  
11       "The initial condition for the drainage layer used only  
12       the partitioning coefficient and soil concentrations for  
13       the Kent Kangley material since the bulk of the drainage  
14       layer material has come from this source." Did I read  
15       that correctly?

16  A.   Yes, you did.

17  Q.   It says the drainage layer material. Now, the type 1  
18       fill is actually more than the drainage layer material;  
19       isn't that right?

20  A.   Correct.

21  Q.   It would also include like the face of the embankment?

22  A.   Yes, it would.

23  Q.   And the face of the embankment hasn't been constructed  
24       yet, has it?

25  A.   I don't believe it's all the way extended out.

**AR 056778**

1 Q. So do you know whether or not it's been constructed?  
2 A. No, I don't know.  
3 Q. Now, I want to ask about I think the simulations that you  
4 ran based on these concentrations. So if I understand  
5 this correctly, for the model run you did for metals, you  
6 assumed that there would be metals in the general fill  
7 criteria present in the embankment at the maximum soil  
8 concentrations in milligrams per kilogram as stated in  
9 the 401; is that right?  
10 A. Correct.  
11 Q. Now, for the TPHs, if I understand it correctly, it looks  
12 like you didn't run a model run assuming TPHs were  
13 present in the embankment at the maximum allowable  
14 concentrations; is that right?  
15 A. We did not make that run.  
16 Q. So you did a model run for the First Avenue Bridge and  
17 the Black River Quarry fill; is that right?  
18 A. Correct.  
19 Q. And in that you assumed heavy oil concentrations of 810  
20 milligrams per kilogram for First Avenue Bridge and 270  
21 milligrams per kilogram for the Black River Quarry; is  
22 that right?  
23 A. No, that's not right. We used 270 for the Black River  
24 Quarry.  
25 Q. Didn't I just say that? I might have misspoke.

**AR 056779**

1 A. You said 810, but I'm not sure what that refers to.  
2 Q. I think I said 810 for the First Avenue Bridge.  
3 A. Right. No, we did not use that number.  
4 Q. Okay. Is the number that you did use stated in your  
5 report?  
6 A. Yes, it's on page 11.  
7 Q. And what is that concentration?  
8 A. Went with the maximum detected amount that was actually  
9 used in the fill, which is 270.  
10 Q. Okay. And that's for the Black River Quarry?  
11 A. Well, they were placed actually one on top of the other,  
12 so they are one unit there.  
13 Q. Okay. And then for purposes of the model run, you put  
14 that fill in a specific location in the embankment; is  
15 that right?  
16 A. Correct.  
17 Q. And that's depicted on figure 4 and figure 5?  
18 A. Figure 4 is the Hamm Creek.  
19 Q. I'm sorry, you're right.  
20 A. Figure 5 is the First Avenue Bridge.  
21 Q. Okay.  
22 A. And Black River Quarry.  
23 Q. Okay. I think I might have asked you before, gasoline,  
24 diesel and heavy oil were allowed under the attachment E  
25 to the 401 certification?

**AR 056780**

1 A. I can't remember which way they break down the TPH  
2 compounds.

3 Q. Why don't we look at Exhibit 1, attachment E, the very  
4 last page. So if I'm reading this right -- do you have  
5 it there?

6 A. Yes, I do.

7 Q. So for the final --

8 MR. REAVIS: Which exhibit?

9 MR. WITEK: It's Exhibit 1, very last page.

10 Q. So it says, "Final Drainage Layer Cover," so that's the  
11 drainage layer cover we see on your figure 2, and then  
12 it's got gasoline, 30; diesel, 460; and heavy oils 2,000;  
13 right?

14 A. Correct.

15 Q. And did you do any model runs with gasoline, diesel or  
16 heavy oil in the drainage layer cover?

17 A. No.

18 Q. Thank you. ACC doesn't have any more questions.

19 MS. COTTINGHAM: Any redirect?

20 MR. REAVIS: Just a couple.

21

22 EXAMINATION

23 BY MR. REAVIS:

24 Q. I wanted to ask you about this area that appears to be  
25 olive green, if I'm looking at it correctly, till, is

**AR 056781**

1       that right?

2   A.   Your color choices are probably better than mine, but go  
3       ahead.

4   Q.   Probably worse, but I think we agree on the glacial till  
5       layer there?

6   A.   Correct.

7   Q.   How did you arrive at the information of where the till  
8       is located in this particular cross-section?

9   A.   We have mapped out the till connected with a separate  
10       project for the port across most of the area from east of  
11       the airport all the way to Puget Sound.  And then what we  
12       did is we overlaid that map of the thickness of the till,  
13       the elevation at the top and the bottom, with the  
14       topography, and we found for the most part when we get  
15       out to Miller Creek, much of Des Moines Creek and much of  
16       Walker Creek, that the topography is actually cut through  
17       the elevation of the till, so the till is actually  
18       missing in those areas.

19  Q.   Okay.  Now, Mr. Witek asked you some questions about this  
20       figure 3-5 in the PGG report.

21  A.   Right.

22  Q.   And whether the till was in the same location?

23  A.   Right.

24  Q.   Can you tell us by looking at Mr. Ellingson's figure  
25       where his cross-section appears as opposed to the one

**AR 056782**

1           that you have here?

2   A.   I believe his cross-section is farther to the south into  
3       an area where the MSE wall would be constructed.

4   Q.   So is that in the same area or a different area from  
5       where your figure --

6   A.   I think it's several hundred feet south.

7   Q.   Is the till in that area continuous or discontinuous?

8   A.   The extent of the till, it varies quite a bit.  For most  
9       of the area along the embankment, it looks like the till  
10      has been eroded away.  There are a few small areas where  
11      it extends and one or two areas where it actually extends  
12      out to Miller Creek.

13  Q.   Now, have you developed an opinion in the course of your  
14      work about whether the embankment would be, the criteria,  
15      if the criteria for the remainder of the embankment were  
16      used in the entirety of the embankment, in other words,  
17      just eliminating the wedge all together, have you done  
18      any sort of calculations to determine whether that would  
19      be protective of water quality?

20  A.   We have for those.

21  Q.   And what does that show?

22  A.   We found that even with the wedge removed, it's still  
23      protective of water quality.  The concentrations creep  
24      up, predicted concentrations from the model are slightly  
25      higher but on the order of only a few percent higher.

**AR 056783**

1 Q. Have you reviewed Ms. Gould's calculations for TPH  
2 concentrations and whether or not those are protective?

3 MR. WITEK: I am going to object. This is  
4 beyond the scope of the questions we asked on cross.

5 MR. REAVIS: I think he went into some detail  
6 about running the model for TPH and, you know, what  
7 Mr. Riley did with TPH, and I just wanted to follow up to  
8 see whether he had done any sort of review of TPH.

9 MR. WITEK: We didn't ask him anything about  
10 what Ms. Gould did or didn't do.

11 MS. COTTINGHAM: I'll allow the question.

12 Q. (Continuing By Mr. Reavis): Do you have any opinion  
13 about the results Ms. Gould came up with based upon her  
14 TPH review?

15 A. I actually haven't spent much time on that.

16 Q. Okay. I think that's all I have. Thanks.

17 MS. COTTINGHAM: Mr. Kray, do you have any  
18 questions?

19 MR. KRAY: No, Your Honor.

20 MS. COTTINGHAM: Any board questions?

21 MR. LYNCH: No questions.

22 MR. JENSEN: No.

23 MS. COTTINGHAM: Thank you, Mr. Riley. You're  
24 excused.

25 MR. REAVIS: Ready for our next witness. John

**AR 056784**

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Strunk.

JOHN STRUNK, having been first duly sworn on oath or affirmed to tell the truth, the whole truth and nothing but the truth, testified as follows:

EXAMINATION

BY MR. REAVIS:

Q. Could you please state and spell your name.

A. Certainly. John Strunk, S-T-R-U-N-K.

Q. How are you employed, Mr. Strunk?

A. I am a partner with environmental water resources consulting firm called Aspect Consulting located on Bainbridge Island, Washington.

Q. And could you give us a brief run-down of your educational background.

A. I have a bachelor's degree in geology and a coordinate major in environmental studies from University of Vermont which I received in 1984.

Q. And how have you been employed then since receiving that degree?

A. Since that time, I worked for a consulting firm in Burlington, Vermont called Wagner, Heindel and Noyes, which was a groundwater consulting firm. After that, from '84 to '89, worked for the Vermont State Agency of

**AR 056785**



1 Environmental Conservation as a hydrogeologist in their  
2 hazardous materials management program evaluating  
3 hazardous waste sites.

4 From '89 to '95 I worked for the consulting firm  
5 Converse Consultants in Seattle, Washington; '95 to 2001  
6 as a geologist for Associated Earth Sciences, which is a  
7 consulting firm in the Seattle area; and currently I'm a  
8 partner with Aspect Consulting.

9 Q. And is your CV attached to your prefiled testimony?

10 A. Yes, it is.

11 Q. Can you tell us what work you have performed relative to  
12 the 401 certification and the third runway project?

13 A. Specifically, I was involved in what has been termed the  
14 preferential pathways analysis, which I believe you heard  
15 about earlier this week.

16 Q. Is that what Mr. Wang testified about?

17 A. That's correct.

18 Q. Were you here when Mr. Wang testified?

19 A. Yes, I was.

20 Q. The diagrams that he was referring to, who produced  
21 those?

22 A. That was work that primarily I produced.

23 Q. Did you complete a report summarizing your conclusions?

24 A. Yes, I did, and I believe that report is dated June 19th  
25 of 2001.

**AR 056786**

1 Q. Let me ask you to refer to Exhibit 76. Does that appear  
2 to be a copy of your June 19th, 2001 report?

3 A. Yes, it is.

4 Q. I don't want to repeat all of what Mr. Wang testified  
5 about, but are there conclusions in your report that  
6 weren't addressed by Mr. Wang the other day?

7 A. I believe there's a few conclusions. Mr. Wang did a very  
8 good job going over the materials in his report.  
9 Primarily, the main issue I think is associated with the  
10 construction of the existing utility lines in association  
11 with the third runway. And I believe Mr. Wang didn't  
12 necessarily show that the only existing utility lines is  
13 for a communications duct bank that will actually tie in  
14 to an existing communications duct bank that is actually  
15 established for the two existing runways. So, in short,  
16 there won't be an actual construction of utilities from  
17 the main terminal area, or the AOMA, where some of the  
18 contamination sources are, out to the third runway.

19 Q. Do you have a figure that shows that particular utility?

20 A. I should. I believe this figure, which I believe it's  
21 figure 8 in the report, last figure, highlights the known  
22 utilities associated with the third runway. They are  
23 highlighted in the green color along the third runway  
24 area. There's also a number of utilities that were  
25 constructed in 2000 that are also highlighted in that

**AR 056787**

1 same olive green and they're just west of the main  
2 terminal area.

3 It's a tough figure to see, a lot of utility lines  
4 of course out there associated with this infrastructure,  
5 but right at the main portion just west of the main  
6 terminal area, there's a set of red lines that are  
7 associated with some existing communications duct banks  
8 that are located about four and half feet deep, and my  
9 understanding, in discussions with port environmental  
10 staff, is that those are the only lines that currently  
11 are planned for the third runway project.

12 Q. And what, if anything, is being done then in the  
13 construction of those utility corridors to prevent  
14 migration?

15 A. One of the conditions in the 401, condition F(1),  
16 establishes best management practices for areas within  
17 the AOMA that could potentially encounter contaminated  
18 groundwater, and those conditions state that the BMPs  
19 should use a controlled density fill, which is a lean  
20 concrete type mixture, to place in newly-constructed  
21 utility backfill lines if contaminated groundwater is  
22 encountered during construction activities.

23 Q. What does that concrete backfill do for it?

24 A. Essentially a CDF, or controlled density fill, is very  
25 similar to a concrete mixture. It sets up, it's readily

**AR 056788**

1 used in the construction industry, it's a much lower  
2 permeability than a granular backfill material and,  
3 therefore, by decreasing the permeability, essentially  
4 you're preventing any type of migrations of liquids or  
5 groundwater in that utility line trench.

6 MS. COTTINGHAM: You can go ahead and have a  
7 seat unless you need to continue pointing to a map.

8 Q. (Continuing By Mr. Reavis): Can you just describe for us  
9 what a perched groundwater zone is?

10 A. Certainly. In the areas of the airport there's units  
11 called glacial till unit, which we have heard about this  
12 week. That is a relatively low permeable unit, it has  
13 been described as hardpan or would look like a concrete  
14 type of mixture. When rainwater or infiltrating  
15 precipitation encounters that layer, it tends to pool up  
16 and, therefore, it's termed a perched water condition.

17 Q. How does that differ then from what has been referred to  
18 as the Qva or regional aquifer?

19 A. The Qva aquifer is a sand and gravel aquifer that is  
20 throughout the entire Des Moines upland area, which  
21 includes the SeaTac International Airport, and it is a  
22 rather large -- encompasses a much larger area. Perched  
23 zones tend to be much more isolated.

24 Q. Do you have a figure that illustrates that?

25 A. I believe I do. This figure is essentially a

**AR 056789**

1 cross-section that goes through the airport that is in  
2 the report, I believe it's figure 6. It shows the  
3 location of the glacial till unit, which is a unit that  
4 varies in thickness throughout the airport. It's  
5 actually missing in fairly substantial areas, especially  
6 under the existing runways that were perhaps due to  
7 grading activities associated with build-out of the  
8 existing runways.

9 Perched water is contained either on top of this  
10 glacial till unit in fill or recessional outwash deposits  
11 or actually within interbedded sandier zones within the  
12 glacial till. Those are isolated roughly 20 to 30 feet  
13 in depth from the more regional Qva aquifer, which is  
14 this zone here denoted in blue.

15 Q. Okay. Thank you.

16 MS. COTTINGHAM: Can I ask a question. What  
17 color did you say the perched till was on this?

18 THE WITNESS: The till zone is a green color.

19 MS. COTTINGHAM: The perched.

20 THE WITNESS: The perched water appears as  
21 little perched areas of blue and then there's  
22 contaminated zone that are shown in yellow within that.

23 Q. (Continuing By Mr. Reavis): Let me ask you before you  
24 sit down, do you have a copy of figure 1 there?

25 A. I don't believe I do.

**AR 056790**

1 Q. I think there should be one in the exhibit. Can you find  
2 figure 1 in your copy there?

3 A. Yes, there is one right here.

4 Q. Maybe it would be helpful for us if you would point out  
5 to us the example of the perched groundwater as opposed  
6 to the Qva.

7 A. The Qva aquifer is this main aquifer zone here in blue.  
8 Perched water occurs on top or within the glacial till  
9 unit and is primarily associated with these fill or  
10 recessional outwash deposits that are deposited on top of  
11 the till as well as sandier or interbedded zones within  
12 the till. There's roughly a 20- to 30-foot difference  
13 between elevations in the perched zone as compared to  
14 down into the Qva.

15 Q. Are the perched zones continuous or discontinuous?

16 A. The perched zones are discontinuous.

17 MR. REAVIS: That's all I have. Thanks.

18 MR. KRAY: Nothing for Ecology.

19 MS. COTTINGHAM: Cross.

20

21

EXAMINATION

22 BY MR. STOCK:

23 Q. Mr. Strunk, could you refer back to your figure 8. On  
24 page 9 of your prefiled you state, "Construction of the  
25 third runway includes the completion of only one utility,

**AR 056791**

1 a new communications duct bank between the AOMA and the  
2 third runway project site." Now, you don't mean to  
3 suggest there's only one utility line connecting the  
4 airport operations and maintenance area and the third  
5 runway site, do you?

6 A. My understanding is from construction that occurred in  
7 2001, there was one utility line that was primarily  
8 associated with the communications duct bank.

9 Q. In fact, if we look at figure 8, don't you agree that  
10 every green line around the site of the proposed runway  
11 is a utility line that's going to be constructed or  
12 proposed to be constructed by the third runway project?

13 A. That's correct, but in terms of actual construction, new  
14 construction of utilities that would occur within the  
15 main AOMA area where contamination zones would be present  
16 to the third runway, there is only one such utility line  
17 that --

18 Q. It's a simple question: You agree there's significantly  
19 more utility lines that are proposed to be constructed by  
20 the third runway project?

21 A. Yes, I believe I testified earlier I stated that those  
22 were highlighted in that olive green.

23 Q. The groundwater underneath the airport operations and  
24 maintenance area is contaminated, is it not?

25 A. In certain areas there is contamination that's present,

**AR 056792**

1       yes.

2   Q.   And that's the Qva aquifer?

3   A.   I believe there's several sites in the Qva aquifer.

4   Q.   And there are, in fact, several sites in the Qva aquifer

5       that are contaminated above MTCA cleanup levels; isn't

6       that true?

7   A.   That's correct.

8   Q.   And the Qva aquifer discharges at some points to Des

9       Moines Creek, does it not?

10  A.   Yes, it does.

11  Q.   And the Qva aquifer also feeds some of the wetlands in

12       the third runway site; isn't that true?

13  A.   Yes, that's correct.

14  Q.   In fact, it feeds -- a majority of the wetlands receive a

15       component of discharge from the Qva aquifer; isn't that

16       true?

17  A.   Based on some of our mapping, that would be true.

18  Q.   And one of your conclusions is that the drainage layer

19       cover will not be a preferred pathway for the

20       contaminants in the AOMA; is that correct?

21  A.   That's correct.

22  Q.   And you came to that conclusion without doing any sort of

23       analysis to determine whether the drainage layer cover

24       underneath the embankment would be a preferential pathway

25       for those contaminants; isn't that right?

**AR 056793**



1 A. That's not necessarily true. I --

2 Q. Well, do you recall me taking your deposition on --

3 MR. REAVIS: Can he finish his answer to that  
4 question before he moves on?

5 MR. STOCK: Well, he's answered it enough for  
6 me to impeach him with his answer in his deposition.

7 Q. Do you recall me taking your deposition on February 13th?

8 A. Yes, I do.

9 Q. And do you recall me asking this question and you giving  
10 this answer on page 58: Question: "Did you do any sort  
11 of analysis to determine whether the drainage layer  
12 underneath the embankment will be a preferential pathway  
13 for contaminants in the airport operations and  
14 maintenance area?" Answer: "No, I have not. Based on  
15 the data I reviewed, I have concluded that there isn't  
16 the potential for contaminants to migrate beyond the  
17 boundary of the AOMA."

18 Do you recall me asking that question and you giving  
19 that answer?

20 A. Yes, I do.

21 Q. So you didn't do any sort of analysis, you just drew that  
22 conclusion; isn't that right?

23 MR. KRAY: Objection. Mischaracterizes the  
24 witness's testimony in the deposition.

25 Q. Isn't that right?

**AR 056794**

1 A. I didn't do analysis; I reviewed the PGG report that  
2 concluded there would not be an effect of the Qva flow  
3 conditions as a result of build-out of the third runway  
4 embankment.

5 Q. And you haven't performed any modelling other than on a  
6 conceptual basis with respect to the lateral movement of  
7 known contaminants in the Qva aquifer; is that right?

8 A. I've used the actual measurements that were collected  
9 from monitoring wells that bound various specific  
10 contaminated sites out at the airport, so I'm using  
11 actual real data that various consultants over a 15-year  
12 period have collected measurements from.

13 Q. But you have only done a conceptual model; isn't that  
14 true?

15 A. I have used actual data.

16 Q. It's a conceptual model, isn't it?

17 A. I have used actual data to draw conclusions in terms of  
18 the extent of that contamination and used the conceptual  
19 understanding of the geologic conditions out at the  
20 airport.

21 Q. Right, you defined it for the Department of Ecology as a  
22 conceptual model?

23 A. That's correct.

24 Q. And the main purpose of the groundwater study required by  
25 the agreed order is to perform a numeric modelling of the

**AR 056795**

1       fate and transport of contaminants underneath the airport  
2       operations and maintenance area, correct?

3       A.   That's correct.

4       Q.   And that numeric modelling required by the agreed order  
5       has not been done, has it?

6       A.   Large portions of the work to support the numeric  
7       modelling has been done, but the actual modelling has not  
8       been done.

9       Q.   Right, the modelling itself, the numeric modelling itself  
10      that will predict the fate and transport of contaminants  
11      underneath the airport operations and maintenance area  
12      has not been done?

13                 MR. KRAY:  Objection, asked and answered.

14      Q.   Correct?

15                 MR. KRAY:  Objection, asked and answered.

16                 MR. STOCK:  I don't think he answered it.  It's  
17      a simple question.

18                 MR. KRAY:  Address my objection.

19                 MS. COTTINGHAM:  You want to repeat the  
20      question.

21                 MR. STOCK:  I'll just reask it.

22      Q.   You agree that numeric modelling required by the agreed  
23      order to predict the fate and transport of contaminants  
24      in the Qva aquifer underneath the airport operations and  
25      maintenance area has not been done?

**AR 056796**

1 MR. KRAY: Objection, asked and answered.

2 MS. COTTINGHAM: I'm going to allow the  
3 question.

4 A. Actual modelling simulations haven't been done, but  
5 there's been a tremendous amount of work to build the  
6 model, and so I would say the modelling process is well  
7 under way.

8 Q. No numeric modelling has been done, correct?

9 A. No modelling simulations, that's correct.

10 Q. Now, there are areas outside of the airport operations  
11 and maintenance area, but within the proposed third  
12 runway site, where there are areas of contamination;  
13 isn't that true?

14 MR. KRAY: Objection. Vague.

15 Q. You understand the question, don't you, Mr. Strunk? You  
16 answered it in your deposition.

17 A. Could you repeat the question again.

18 Q. Sure. There are areas outside of the airport operations  
19 and maintenance area, but within the proposed third  
20 runway construction site, where there are areas of  
21 contamination?

22 A. I would guess that would be how you define the word  
23 contamination.

24 Q. Well, one of the sites that you identified in your  
25 deposition was the industrial waste system lagoons,

**AR 056797**

1 correct?

2 A. That's correct.

3 Q. And one of the constituents of concern in the industrial  
4 waste system lagoons was 1,1,1-trichloroethane,  
5 correct?

6 A. I believe I made a correction to my deposition and  
7 corrected that to that compound should be 1,1-  
8 dichloroethane, but there is one monitoring well that I  
9 am aware of that is below MTCA method B cleanup standards  
10 for that particular constituent.

11 Q. But with respect to that particular constituent, 1,1-  
12 dichloroethane, that constituent is above groundwater  
13 quality criteria, isn't it?

14 A. The groundwater quality criteria for that constituent is  
15 1; the sample data that we collected from that has varied  
16 by 1.3 to 1.7, so it's very slightly elevated.

17 Q. It's over the groundwater criteria for that constituent,  
18 isn't it?

19 A. Right, but the MTCA cleanup level is much higher than the  
20 groundwater quality criteria.

21 Q. We are dealing with water quality criteria here, so I  
22 just want to make sure you agree with me that that  
23 constituent is over the groundwater quality criteria;  
24 isn't that correct?

25 A. Just very slightly.

**AR 056798**

1 Q. And you also found TPHs and other volatile organics at  
2 the industrial waste system lagoon, correct?

3 A. We detected them above method detection limits; however,  
4 they were below any type of regulatory standard.

5 Q. And you didn't do any sort of analysis as to the  
6 potential impact on the fate and transport of the  
7 contaminants in the area of the industrial waste system  
8 lagoons from the third runway construction, did you?

9 A. It's my opinion that the industrial waste system area  
10 is --

11 Q. Well, I'm not looking for your opinion right now, Mr.  
12 Strunk, and Mr. Reavis can offer that if he wants to on  
13 redirect. What I want to know is an answer to my  
14 question, and that is, you didn't do any sort of analysis  
15 with respect to potential impacts of fate and transport  
16 of these contaminants, these known contaminants in the  
17 industrial waste system lagoon area with respect to third  
18 runway construction, did you? You didn't do any sort of  
19 analysis?

20 A. We evaluated whether or not those contaminants were above  
21 MTCA standards and there were no such indications on any  
22 of the perched wells or wells completed in the Qva at  
23 that facility that would have triggered that.

24 Q. You didn't do any analysis determining the fate and  
25 transport, did you?

**AR 056799**

1 A. There's essentially the groundwater quality below  
2 regulatory standard for MTCA criteria, which was the  
3 criteria we were utilizing for when we performed the  
4 preferential pathways analysis.

5 Q. So the answer to my question is no, you didn't do any  
6 sort of analysis?

7 A. Yeah, in my opinion, it wasn't necessary.

8 Q. So the answer is no?

9 A. Correct.

10 Q. And the same with respect to the site of the old  
11 Weyerhaeuser hangar, there's contamination at that site  
12 on the west side of the runway, isn't there?

13 A. Not that I am aware of.

14 Q. Well, I can go through your deposition, and that's a site  
15 that you told me about at your deposition, the old  
16 hanger, the old Weyerhaeuser hangar. Do you recall that  
17 testimony?

18 A. I recall we had discussions about other sites that I was  
19 aware of in the third runway build-out footprint. I  
20 mentioned Weyerhaeuser, but I don't believe I gave you an  
21 indication that there was contamination associated with  
22 that facility.

23 Q. Well, there's TPH in that area, isn't there?

24 A. Not that I am aware of.

25 Q. You're going to make me eat up some of my time going

**AR 056800**

1 through your deposition. Page 74. Question: "Are you  
2 aware of any other areas of contamination outside of the  
3 airport operations and maintenance area within the site  
4 of the proposed third runway construction where there  
5 were constituents of concern below MTCA standard?"

6 Answer: "The only site that I can think of that we  
7 looked at in evaluating the groundwater study would be  
8 the Weyerhaeuser hangar located on the west side of the  
9 existing runway." Question: "And what did you find in  
10 terms of constituents of concern in the area of the  
11 Weyerhaeuser hangar on the west side of the runway?"

12 Answer: "Again, it would be hard to specifically address  
13 that without looking at the report. However, it was an  
14 underground storage tank system primarily associated with  
15 fueling Weyerhaeuser private aircraft. Therefore, it  
16 would be aircraft fuel types of compounds, primarily  
17 total petroleum hydrocarbons, perhaps benzene, toluene,  
18 xylene and ethylbenzene." Do you recall me asking those  
19 questions and you giving those answers?

20 A. I do recall that, but, again, I believe I said I'd have  
21 to go back and look at the report to give any kind of  
22 specifics on that facility.

23 Q. Right. And you didn't do any sort of analysis to  
24 determine the fate and transport of those contaminants at  
25 the site of the old Weyerhaeuser hangar, did you?

**AR 056801**



1 MR. KRAY: Objection to the term contaminants.  
2 I think it mischaracterizes the testimony.

3 MR. REAVIS: Well, I don't think there's been a  
4 foundation laid that this witness has any knowledge that  
5 there is contamination.

6 MS. COTTINGHAM: Sustained.

7 MR. STOCK: He just said it in his testimony.

8 MR. KRAY: I disagree.

9 MS. COTTINGHAM: Sustained.

10 Q. (Continuing By Mr. Stock): Did you do any sort of  
11 analysis of the constituents concerned at the old  
12 Weyerhaeuser hangar in terms of their fate and transport?

13 A. Again, using the data that we compiled in the data base  
14 for performing the analysis on the preferential pathways,  
15 that site did not show that there was any types of  
16 contamination that would have been above a regulatory  
17 standard, so, therefore, it's my opinion that it wasn't  
18 necessary to evaluate that site any further.

19 Q. All right. Let's shift gears and talk about your  
20 preferred pathway analysis, which was Exhibit 76. That  
21 preferred pathway analysis is a conceptual model, is it  
22 not?

23 A. There's a conceptual understanding of the hydrogeologic  
24 conditions that are a foundation of this report; however,  
25 the report also utilizes actual field measurements of

**AR 056802**

1 groundwater chemistry that has been collected for, again,  
2 on some of these facilities over a 15-year period.

3 Q. Essentially, what you did to come up with this preferred  
4 pathway analysis was to sit down, look at the data, plot  
5 it out on a map, and use your professional judgment to  
6 draw the conclusions you reached in this June 19  
7 technical memorandum; isn't that right?

8 A. The data speaks for itself when you -- it's a very  
9 standard technique in this industry to plot out and map  
10 contaminant boundaries using actual data that you collect  
11 and measure in the field.

12 Q. Other than using a computer to plot the environmental  
13 data on the maps, you didn't do any sort of computer  
14 analysis to come to your conclusions in the preferred  
15 pathway analysis; isn't that right?

16 MR. KRAY: Objection, confusing.

17 MS. COTTINGHAM: Why don't you recharacterize  
18 your question.

19 MR. STOCK: Certainly.

20 Q. Other than plotting the data points out on a map, you  
21 didn't do any sort of computer analysis to come to your  
22 conclusions in the preferential pathway analysis, did  
23 you?

24 A. I'm not quite clear on what you mean by computer  
25 analysis.

**AR 056803**

1 Q. Well, let me refresh your recollection with your  
2 deposition. Page 40. Did I ask this question and did  
3 you give this answer: Question: "So other than using a  
4 computer to plot the environmental data on the maps, you  
5 didn't do any sort of computer analysis to come to your  
6 conclusions; is that right?" Answer: "That's  
7 correct."

8 Do you recall that question and answer?

9 A. If you're referring to computer analysis by computer  
10 modelling, then that would be correct. However, we used  
11 the computer to query data in the data base, we used the  
12 computer to plot that data on a series of maps, we used  
13 the computer to generate flow directions in Qva and the  
14 perched water-bearing zone, so, in a sense, those are  
15 types of analysis, but in terms of actual modelling, no,  
16 we did not use a model to support this report.

17 Q. So you're changing your answer from your deposition  
18 answer?

19 MR. KRAY: Objection, argumentative.

20 MS. COTTINGHAM: Why don't you ask a question,  
21 rather than being argumentative, ask a straightforward  
22 question.

23 MR. STOCK: I don't have any further questions.

24 MS. COTTINGHAM: Any redirect?

25 MR. REAVIS: Yes.

**AR 056804**

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EXAMINATION

BY MR. REAVIS:

Q. Let me ask you some questions about this whole issue of the AOMA contamination and what you did or didn't do to analyze that. And why don't you just tell us what you did do in order to define where the contamination is and whether it's likely to move.

A. Well, essentially, one of the tasks that I was tasked to for the agreed order groundwater study, which is a very broad study of an area of roughly about 30 square miles around Sea-Tac Airport, is to compile a very extensive data base of information on groundwater chemistry, information on monitoring wells, soil contamination, groundwater contamination, what have you. And we utilized that data base to draw conclusions on where various compounds of concern would be detected above MTCA method A or method B groundwater cleanup levels.

Using that information, we were then able to plot those locations on a base map. And the majority of those sites fall within what's been termed the aviation or airport operations and maintenance area, which is the area of Sea-Tac Airport where historical aircraft-fueling activities have occurred since roughly the late 1940s, early 1950s. Those are the areas where your main fuel underground storage tank systems are situated at, your

**AR 056805**

1 hydrant piping lines and your large volume type of  
2 release sites. And both perched water and Qva water  
3 that has been impacted by constituents of concern above  
4 MTCA standards all plot out within that area.

5 Q. Now, how much data did you have to come up with those?  
6 A. The data base contains hundreds of wells. It probably  
7 has tens of thousands of analytical chemistry information  
8 in that. It has information on total petroleum  
9 hydrocarbon compounds, volatile organic compounds,  
10 glycols, metals, general groundwater parameters. So it's  
11 quite an extensive data base.

12 Q. During what time period was that data collected?  
13 A. I believe the earliest records that I am aware of are  
14 roughly 1985 through the present. It's actually an on-  
15 going data base, and it's one of the conditions in one of  
16 the F(1) conditions to keep that data base updated.

17 Q. And how often or how frequently are those wells sampled?  
18 A. It varies between various airline tenants and their  
19 consultants. The majority of them, I would say, are  
20 sampled on a quarterly basis or four times a year.

21 Q. Now, with that quantity of data, do you need a model in  
22 order to draw the conclusions that you have drawn here?  
23 A. Again, I think the data represents on some of these  
24 facilities monitoring data over a 15-year period, and  
25 essentially what it has shown is that the contamination

**AR 056806**

1 is well bounded within the AOMA area. I believe the  
2 largest length of a contaminated source area that we have  
3 seen is roughly about 550 feet. And, again, the western  
4 boundary from the AOMA is over half a mile to the third  
5 runway construction area.

6 Q. Now, do you know whether these IWS lagoons that Mr. Stock  
7 was referring to are part of the port's master plan  
8 update projects?

9 MR. STOCK: Object, no foundation.

10 MR. REAVIS: I'm just asking if he knows, and  
11 if the answer is no, then we won't go on, but if it's  
12 yes, then I think he has established the foundation.

13 MR. STOCK: Well, that won't be a proper  
14 foundation, but I can --

15 MS. COTTINGHAM: I am going to sustain the  
16 objection.

17 Q. (Continuing By Mr. Reavis) Do you know what's included  
18 within the master plan update project scope?

19 A. I'm not that familiar with the full master plan, no.

20 Q. Now, where is the IWS located where that contamination  
21 that Mr. Stock was referring to is?

22 A. It's in the southwestern portion of the airport; it's  
23 well outside of the area for the third runway  
24 construction project.

25 Q. Do you know which way the groundwater flows from that IWS

**AR 056807**

1 location?

2 A. Yes, it flows in the Qva aquifer, it flows to the  
3 southwest.

4 Q. Would that be toward or away from the third runway?

5 A. That would be away from the third runway area.

6 Q. Do you have any information that this Weyerhaeuser site  
7 is or is not contaminated?

8 A. I believe Hart Crowser did an assessment of that  
9 facility, and the information that I reviewed from that  
10 showed no indications of contamination.

11 MR. STOCK: I'm going to object to the word  
12 contamination unless he defines it. Mr. Reavis objected,  
13 or I think it may have been Mr. Kray objected to my use  
14 of the word and I had to switch to constituents of  
15 concern, so if we're going to object to people using the  
16 word contamination, then it ought to be defined each  
17 time.

18 MS. COTTINGHAM: Sustained.

19 Q. (Continuing By Mr. Reavis): Can you tell us what you  
20 know about the constituents in the area of the  
21 Weyerhaeuser location?

22 A. Certainly. My understanding of that facility, there were  
23 three monitoring wells that were established to a depth  
24 of about 15 to 17 feet, which was just beneath the bottom  
25 of the underground storage tanks. There was no

**AR 056808**

1           indication of any odors of petroleum compounds that were  
2           detected during drilling. There was field detection with  
3           a photo ionization unit, which is a field instrument  
4           which is used to measure volatile organic type of  
5           petroleum compounds. Those were all non-detected. And  
6           there was no perched groundwater encountered in any of  
7           those wells.

8   Q.   Okay. I think that's all I have. Thanks.

9                   MS. COTTINGHAM: Mr. Kray, do you have any  
10           questions?

11                   MR. KRAY: No questions.

12                   MS. COTTINGHAM: Any board questions?

13                   MR. JENSEN: No questions.

14                   MR. LYNCH: No questions.

15                   MS. COTTINGHAM: Thank you, Mr. Strunk. You're  
16           excused.

17  
18           JAN CASSIN, Ph.D., having been first duly sworn on oath  
19           or affirmed to tell the truth, the whole truth and  
20           nothing but the truth, testified as follows:

21

22   EXAMINATION

23           BY MR. PEARCE:

24   Q.   Good afternoon, Dr. Cassin. Could you state your name  
25           and spell your last name for the record.

**AR 056809**



1 A. Jan Cassin, C-A-S-S-I-N.

2 Q. Could you give us a brief rundown of your educational  
3 background.

4 A. Yes. I have a bachelor's in biology from the University  
5 of Colorado. I have a master's of science in ecology and  
6 evolutionary biology from the University of Michigan, and  
7 also a Ph.D. in ecology and evolutionary biology from the  
8 University of Michigan. My specialty was in wetland  
9 ecology.

10 Q. Is your professional resume' attached to your direct  
11 testimony in this matter?

12 A. Yes, it is.

13 Q. What is your current employment?

14 A. I am a senior scientist at Parametrix.

15 Q. Do you have a specialty there?

16 A. I am a wetland scientist there.

17 Q. How much experience do you have as a wetland scientist?

18 A. I have more than 15 years experience working as a wetland  
19 scientist since about 1982.

20 Q. Okay. Could you describe briefly some of your  
21 experience.

22 A. Yes. I primarily have worked in ecosystem restoration  
23 and wetland ecosystem restoration or aquatic ecosystem  
24 restoration.

25 I also do regulatory assistance, wetland

**AR 056810**

1 delineations, and functional assessments.

2 Q. What has been your role in the port's master plan update  
3 project?

4 A. Shortly after I started working at Parametrix, I was  
5 asked by Dr. Kelley to provide a review of the natural  
6 resources mitigation plan and, specifically, to review  
7 that plan for its adequacy in mitigating for the  
8 functions that were impacted by the third runway project.

9 And I also assisted in providing responses or  
10 clarifications or dealing with issues that were raised by  
11 the Corps of Engineers or Ecology in their comments on  
12 the mitigation plan.

13 Q. The board has your testimony, and I don't want to repeat  
14 it, especially in the interest of the hour, but I have a  
15 few questions about selected topics.

16 Does the natural resources mitigation plan propose  
17 creating any forested wetlands?

18 A. Yes, it does. It involves restoration and enhancement of  
19 forested wetlands and also creation of forested wetlands.

20 Q. We haven't moved these boards out of the way yet, let me  
21 do that, and get you to identify them on a map for us, if  
22 you could. Could you identify this? We have seen this  
23 before with Mr. Stockdale's testimony.

24 A. That's an aerial photo of the project area that's  
25 pre-project conditions, as I understand it. The sort of

**AR 056811**

1 bright green areas are the existing wetlands.

2 Q. Could you show us generally where the forested wetlands  
3 would be created?

4 A. This is way too high. There's going to be --

5 Q. You want to set it down. As long as the board can see  
6 it.

7 A. There will be forested wetlands along the Miller Creek  
8 relocation area and the Vacca Farm. There also will be  
9 forested wetlands throughout what we have been calling  
10 the riparian corridor or riparian area along Miller  
11 Creek, also along wetland A17, the tributary to Miller  
12 Creek. Those are the in-basin forested wetlands. There  
13 also will be forested wetlands at the Auburn mitigation  
14 site.

15 Q. If you could use that exhibit, could you explain to the  
16 board what that is and where the drawing is from?

17 A. This is the Vacca Farm mitigation site. I'll just put it  
18 this way because that will orient it the way everything  
19 else is.

20 MS. COTTINGHAM: Can you see it okay?

21 MR. LYNCH: Oh, yes.

22 A. This is Lora Lake right here. This is the existing  
23 channel of Miller Creek. This is the proposed relocated  
24 channel of Miller Creek. This is the sort of prior  
25 converted cropland area here, the plowed area.

**AR 056812**

1 Q. Where is the forested -- did you say there was a forested  
2 wetland being created in that area?

3 A. Yes. The area along the riparian zone of the relocated  
4 channel of Miller Creek here and here and extending on  
5 down to there will be forested wetland. And I believe  
6 that the planting tables in the appendices to the natural  
7 resources mitigation plan contain the planting plans. It  
8 specifies the species that will be planted there and the  
9 densities that will be planted there.

10 Q. Could you look at the natural resource mitigation plan,  
11 that's Exhibit 2014.

12 A. Do we have the appendices?

13 Q. The appendices are in that copy and in the board's copy.  
14 It's Ecology binder 2.

15 A. I believe it's the appendix A.

16 MS. COTTINGHAM: How far back do you think  
17 appendix A is?

18 THE WITNESS: Almost to the end.

19 MR. PEARCE: They're the folded sheets toward  
20 the end. If I could just, with ACC's indulgence, if I  
21 could explain briefly. Appendix A through F are separate  
22 sheets to the NRMP, and for this exhibit they have been  
23 reduced slightly and inserted at the back.

24 THE WITNESS: They're folded over.

25 MS. COTTINGHAM: I don't think our copy is

**AR 056813**

1 going to show the folded over --

2 THE WITNESS: It's appendix A and it's sheet  
3 L5. It has a text table on it and it has a bunch of  
4 little planting details shown.

5 MS. COTTINGHAM: I can find appendix I.

6 MR. PEARCE: It's after I.

7 MS. COTTINGHAM: Oh, it's after I. I was going  
8 on the alphabet I know.

9 MR. PEARCE: A through F are attached  
10 separately and they are at the back.

11 MS. COTTINGHAM: I found appendix L.

12 THE WITNESS: Keep going.

13 MS. COTTINGHAM: Appendix O. Is it after that  
14 or before that?

15 THE WITNESS: After.

16 MS. COTTINGHAM: Appendix A.

17 THE WITNESS: And then sheet L5. It's at the  
18 very, very end.

19 Q. (Continuing By Mr. Pearce): In fact, while we are there,  
20 could you explain briefly for the board what sheets L2  
21 through L6 show?

22 A. L2 through L6 show a couple of the details for planting  
23 the Vacca Farm site. The first two sheets are an  
24 irrigation plan and then the sheet after the irrigation  
25 plan just shows, and that's this big board up here, that

**AR 056814**

1 shows the planting zones. The different hatches on this  
2 plan are areas where different plant communities will be  
3 installed.

4 MS. COTTINGHAM: I'm not sure we're in the same  
5 spot. We have appendix A, but it only has like four  
6 pages. It's got boring logs, hand auger log and then we  
7 go into appendix B, groundwater seepage analysis.

8 MR. PEARCE: Could Wendy take a look at it.

9 MS. COTTINGHAM: Yes. Is it this appendix A,  
10 subsurface explorations?

11 MR. PEARCE: Perhaps we should just move on if  
12 we can't find it. I can just have Miss Cassin explain  
13 what the appendices show and I think that gets the point.

14 MS. CLEMENTS: I don't see them in here. We  
15 have an extra copy right here if that would --

16 MR. PEARCE: Why don't I just have her explain  
17 what's in those. It's not a big point.

18 A. It's basically a cable that calls out the different  
19 planting zones that are shown on this figure here, the  
20 planting plan. For each of these different hatched  
21 areas, there's a list of species that are going to be  
22 planted and the densities that they will be planted in.  
23 And for this area that I have referred to as forested  
24 wetland along the relocated channel of Miller Creek, the  
25 species are things like big leaf maple, Oregon ash, and

**AR 056815**

1 black cottonwood. And there are also a variety of shrubs  
2 that will form a sub canopy or understory to the forested  
3 wetland. The density of tree species are 280 stems per  
4 acre, which is a typical forested tree density in the  
5 Puget Sound lowlands. I believe Ms. Walter testified  
6 about the typical densities of forested wetlands in Puget  
7 Sound lowlands.

8 MR. EGLICK: Can I just clarify we are looking  
9 at appendix A, sheet L5, just so I know and for the  
10 record, that's what we are looking at, L5?

11 THE WITNESS: Yes.

12 MR. EGLICK: Thank you.

13 Q. (Continuing By Mr. Pearce): Are there any forested  
14 riparian buffers being proposed for creation as part of  
15 the natural resource mitigation plan?

16 A. Yes, there are, and I will show you where those are.  
17 There will be forested riparian buffers, both wetland  
18 forest and upland forest, created along Miller Creek and  
19 the Vacca Farmsite and all the way down Miller Creek  
20 from south of the Vacca Farm down here through the  
21 mitigation site. This dark green area shows the extent  
22 of what's called the riparian buffer zone. Those areas  
23 will be forested. There's much existing non-forested  
24 area within here right now. Some of the wetlands and  
25 uplands are open fields, lawns, pastures. Those will be

**AR 056816**

1 planted as forest as part of the mitigation plan, as well  
2 as this area along A17, this tributary to Miller Creek.

3 There will also be forested buffers at the Auburn  
4 mitigation site as well as there will be buffer areas  
5 along Des Moines Creek as well.

6 MS. COTTINGHAM: Can you remind me what  
7 exhibit number this large aerial photo is?

8 MR. PEARCE: It is actually in the -- it's in  
9 this Exhibit 1323. It's a demonstrative exhibit.

10 MS. COTTINGHAM: Thank you.

11 Q. (Continuing By Mr. Pearce): Are there planting plans in  
12 the appendices that you could describe for us that refer  
13 to the planting plans for the forested buffers?

14 A. Yes, there are. They're in appendix B, but I won't ask  
15 you to look at them.

16 Q. D as in dog?

17 A. B as in boy. They're very similar to the planting plan  
18 that I discussed for Vacca Farm. There are tables that  
19 call out for different plant communities and for each  
20 community, there is a list of trees and shrubs that will  
21 be planted in that area and the densities that they will  
22 be planted in in terms of stems per acre. And for all of  
23 the forested areas, the density of trees is 280 trees per  
24 acre when non-forested areas are being planted. There  
25 are some areas of enhancement where trees will be

**AR 056817**



1 infilled, and in those instances, the density of trees is  
2 80 stems per acre because there are already trees  
3 existing in those areas and the mitigation plan is  
4 supplementing the number of trees in those areas.

5 Q. Could you show the board these schematic drawings from  
6 the natural resources mitigation plan and explain to them  
7 what they are.

8 A. This figure is a schematic that's based on the densities  
9 and the spacings in the planting plans. And this shows  
10 the buffer area around Lora Lake that's proposed and the  
11 sort of regraded reshaped shoreline of Lora Lake. This  
12 is the existing conditions of Lora Lake. There is  
13 currently lawn and houses, a retaining wall and a  
14 concrete bulkhead along the edge of the lake.

15 And in part of the mitigation plan the bulkhead will  
16 be removed, the retaining wall will be removed. The  
17 shoreline will be modified to a more gradual slope that's  
18 a more natural lake shoreline slope. And the area  
19 immediately next to the lake will be planted with shrubs  
20 and then a forested buffer along the edge of the lake.  
21 That's one example of forested conditions on the site.

22 And this is another schematic that shows a  
23 cross-section of the Miller Creek riparian buffer zone.  
24 And, again, the top is existing conditions with in many  
25 places houses right along the creek, landscaped gardens,

**AR 056818**

1       lawns, and the bottom cross-section is what the area will  
2       look like after the proposed mitigation plan is  
3       implemented. It calls for forested wetlands and forested  
4       upland buffers with a shrub understory. And this, again,  
5       this schematic, it is a schematic, but it's based on the  
6       densities and spacings of the plants in the planting plan  
7       and also the types of trees and shrubs.

8       Q. Thank you, Miss Cassin. Switching subjects. Are you  
9       familiar with the concept of wetland hydro period?

10      A. Yes, I am.

11      Q. Can wetland hydro periods vary?

12      A. It varies quite a bit naturally both temporally and  
13       spatially. It varies between years and also at different  
14       locations.

15      Q. Do you have an opinion about -- well, are you familiar  
16       with the slope wetlands on the master plan update site?

17      A. Yes, I am.

18      Q. Do you have an opinion about whether those hydro periods  
19       would vary?

20      A. They would vary quite a bit from year to year.

21      Q. With respect to the wetlands to be remaining down slope  
22       of the embankment, have you formed an opinion about  
23       whether a performance standard that would try to mimic  
24       the hydro period is an advisable performance standard?

25      A. I don't believe that it makes much sense to try to match

**AR 056819**

1 a specific hydro period as a performance standard to  
2 either maintain existing conditions or to meet some kind  
3 of target condition for a mitigation. And the reason I  
4 say that is that it would be almost impossible to write a  
5 performance standard for a specific hydro period for a  
6 single wetland because of the variability between years,  
7 and also particularly in slope wetlands within the same  
8 wetland in the same year, there will be different hydro  
9 periods at different parts of the site. So I don't think  
10 it's a useful performance standard to try to match a  
11 specific hydro period. I believe that the use of  
12 multiple performance standards, some of which capture  
13 hydrology and patterns of hydrology as well as other  
14 attributes of the wetland that are related to hydrology,  
15 such as vegetation, are more feasible and more realistic  
16 for wetland mitigation.

17 Q. Have you reviewed the performance standards in the 401  
18 certification?

19 A. Yes, I have.

20 Q. For the remaining wetlands?

21 A. Yes, I have.

22 Q. Do you have an opinion about whether they are adequate?

23 A. I believe that those performance standards will allow  
24 those wetlands to meet the targeted functions in the  
25 mitigation plan.

**AR 056820**

1 Q. Are you aware of any monthly monitoring with respect to  
2 the wetlands that will be remaining on the site?

3 A. Yes, there's been monthly monitoring that has been  
4 conducted in the wetlands down slope from where the  
5 embankment will be. I believe the monthly monitoring  
6 began in February of 2001. Since about August of or  
7 September of 2001, the monitoring data has been collected  
8 twice a month, so there is monthly monitoring data from  
9 February 1st until now, there's twice-monthly monitoring  
10 data from September 2001 until now. So there is  
11 monitoring data for those wetlands.

12 Q. Have you observed those wetlands prior to the monitoring?

13 A. Yes, I have. I conducted a series of site visits as part  
14 of my review of the mitigation plan. I visited those  
15 wetlands a couple of times in 2000, early 2000, and then  
16 again in summer of 2001 and the fall of 2001. So I've  
17 seen those wetlands over the course of several years, a  
18 couple years.

19 Q. Finally, do you understand what's meant by adaptive  
20 management?

21 A. Yes, I believe I do.

22 Q. Could you explain to the board whether that is an  
23 experimental strategy?

24 MR. EGLICK: Objection. The witness may  
25 understand, but I don't think that the answer provided

**AR 056821**

1 any basis for the vagueness of the question to be solved  
2 for anyone else. I think the witness needs to explain  
3 what she means before she can go on.

4 MR. PEARCE: I can lay a foundation.

5 Q. Can you explain what you mean by adaptive management?

6 A. Adaptive management is a method for managing natural  
7 areas or mitigation sites, and it's simply a method where  
8 you use monitoring to track the actual conditions on the  
9 site and use those actual conditions to guide any kind of  
10 management actions or decisions that you make. For  
11 mitigation specifically, doing that detailed monitoring  
12 and using the actual site conditions tells you whether  
13 your mitigation is meeting its targeted goals or whether  
14 it's trending in that direction. And the monitoring  
15 guides any contingency actions or measures that you take  
16 to insure that the mitigation is a success.

17 Q. Based on that understanding of adaptive management, do  
18 you consider it, in your opinion, to be an experimental  
19 strategy?

20 A. I don't consider it to be experimental.

21 MR. PEARCE: Those are all the questions I have  
22 for Dr. Cassin. Thank you.

23 MS. COTTINGHAM: Mr. Kray.

24 MR. KRAY: Nothing for Ecology

25 ////

**AR 056822**

1 EXAMINATION

2 BY MR. EGLICK:

3 Q. Dr. Cassin, you were talking about monitoring of wetlands  
4 at the site just a moment ago. Do you recall that?

5 A. Mm-hmm.

6 Q. You said you had gone out there and visited a few times  
7 over the years; is that right?

8 A. Mm-hmm.

9 Q. Have you actually monitored groundwater piezometer  
10 readings in the wetlands that you visited?

11 A. I wouldn't say that I have actually monitored those  
12 because I haven't been one of the people who has  
13 routinely collected that data, but I have gone out and  
14 visited the piezometer sites and I'm familiar with the  
15 monitoring design for collecting that data, and I've also  
16 looked at some of the data that has come in from that  
17 monitoring.

18 Q. And has that data been, to your knowledge, correlated to  
19 rainfall?

20 A. I don't specifically remember seeing any correlations in  
21 the data that I've looked at.

22 Q. You know, I think I need a new prescription because I  
23 can't quite read the figure number on that board that's  
24 up there. Maybe you could help me out.

25 A. Figure 5.2-2.

**AR 056823**

1 Q. And that's from the NRMP?

2 A. Yes, it is.

3 Q. And that's supposed to be representative of what the  
4 upshot is going to be of the planting plan for what area  
5 again?

6 A. That is for a typical cross-section of the Miller Creek  
7 riparian buffer, and so it's not supposed to be a  
8 specific cross-section; it's a typical cross-section  
9 across basically this area or this area. And it shows a  
10 100-foot average buffer, so it's not intending to show  
11 that specifically or that specifically.

12 Q. So could you just call out for us what are the tree  
13 species shown in this typical cross-section?

14 A. I don't believe that these are supposed to be -- well, I  
15 don't know which species are represented by the graphic  
16 itself, but I do know that the trees --

17 Q. That answers my question then.

18 A. This graphic wouldn't be used alone by anybody trying to  
19 determine what would be planted in this zone. There's a  
20 planting plan that calls out the names of the trees and  
21 the densities.

22 Q. I appreciate that, but my question was can you call out  
23 the species represented in that figure?

24 A. I can tell --

25 Q. Is the answer no?

**AR 056824**

1 A. I can't tell you if this is supposed to be a Sitka  
2 spruce, but I can tell you that this drawing represents  
3 Sitka spruce, western red cedar, black cottonwood, big  
4 leaf maple, red alder and a variety of other trees.

5 Q. Are there any willows shown?

6 A. There are some shrub willows down here along the creek.

7 Q. So would it be correct to say that the taller trees are  
8 the ones you named first and then the willows are the  
9 shrubbier items?

10 A. Some of the shrubby items could be willows. There are  
11 some other shrubs in there as well.

12 Q. Then the taller trees are again, you said --

13 A. There's a variety of tree species, there's black  
14 cottonwood, big leaf maple, red alder, Sitka spruce, I  
15 believe there's some western hemlock as well as western  
16 red cedar in there.

17 Q. And you're not representing, are you, that this schematic  
18 shows the actual mix of trees required under the planting  
19 plan, are you?

20 A. No. That kind of detail and specific information is  
21 included in the planting tables and the planting plans.  
22 There are also some schematics that show looking down on  
23 a site and the typical section. There's some drawings  
24 that have little circles that represent the spacings of  
25 different species and those actually are labeled with the

**AR 056825**



1 specific tree names. So using a combination of that  
2 information, you determine what the actual planting  
3 composition is. This is intended to be a schematic to  
4 show a forest, a typical forest strata and cross-section.

5 Q. And, by the way, did you perform any of the functional  
6 assessments for wetlands on the site?

7 A. No, I didn't perform the functional assessments.

8 Q. Okay. Thank you. I think we're done with that if you  
9 would like to take a seat.

10 Could you look, if you would, please, on page 5 of  
11 your prefiled testimony, paragraph 13. And you have got  
12 a number of bulleted items on that page.

13 A. Yes.

14 Q. For example, do you see it says "Remove riprap, bridges,  
15 trash, weirs," do you see that list there?

16 A. Mm-hmm.

17 Q. Is this list of bulleted items a list of wetland  
18 functions or a list of activities?

19 A. This is a list of activities.

20 Q. Thank you. Could you then look, if you would, please, at  
21 page 6 of your prefiled testimony, paragraph 16, the last  
22 bulleted item, so it's the last part of the text on the  
23 page, if you see where I am.

24 A. It starts, "Significant sources."

25 Q. Yes. And I was wondering, do you have any study that

**AR 056826**

1       quantifies the amount of these pollutants that you're  
2       citing that came supposedly from the residential buy-out  
3       area that you're describing here? You can expand through  
4       your counsel, I just want to know if you have any study  
5       that quantifies this.

6       A. In the actual buy-out area itself?

7       Q. Yes.

8       A. Other than relative concentrations in a study that  
9       includes Miller and Des Moines Creek. No, I don't have  
10      in the specific buy-out area, but the study that I refer  
11      to here has information or data from Miller and Des  
12      Moines Creek.

13     Q. Right. And do you have any study that quantifies the  
14      relative contribution of airport activity to Miller and  
15      Des Moines Creek as opposed to residential activity?

16     A. No, I don't.

17     Q. I did want to ask you another question. You were talking  
18      earlier with Mr. Pearce and you talked about -- well,  
19      actually, here's maybe a quicker way to do it. You have  
20      attached to your testimony, I think, table 4.1-3 from the  
21      NRMP. You've got your vita and then some fold-out maps  
22      and then you've got this table or a version of this table  
23      from the NRMP that's called "Summary of Wetland  
24      Mitigation Credit." Do you see that?

25     A. Yes.

**AR 056827**

1 Q. Okay. Now --

2 MR. PEARCE: Which one is that, Peter?

3 MR. EGLICK: Table 4.1-3 page 4-13.

4 MR. PEARCE: I think it's tab D.

5 MR. EGLICK: I don't have tabs on the one we  
6 got.

7 MS. COTTINGHAM: Tab D.

8 MR. EGLICK: Thank you. I appreciate that.

9 Q. (Continuing By Mr. Eglick): So just looking at this for  
10 a moment, I notice that the category of -- you were  
11 talking about creating, I think you called it, forested  
12 wetlands. Do you recall talking about that?

13 A. Yes.

14 Q. Now, can you show me on this table where it's listed the  
15 amount of acreage for creation of forested wetlands on  
16 site?

17 A. There is no forested wetland creation in basin.

18 Q. So the only forested wetland creation is at Auburn; is  
19 that right?

20 A. There's what I would call restoration and enhancement of  
21 forested wetlands in basin; there is creation at Auburn.

22 Q. Okay. So when you were talking before with Mr. Pearce in  
23 talking about creation of forested wetlands and going  
24 through a description of that, that was then using  
25 perhaps a different term than this table uses from the

**AR 056828**

1 NRMP; is that correct?

2 A. Or I may have included creation when I was summarizing  
3 this, but I intended to say wetland creation occurs at  
4 Auburn, wetland restoration and enhancement occurs in  
5 basin.

6 Q. And then in terms of creation of something that's  
7 forested in basin, the only creation of forested areas in  
8 basin, actual creation, is in what you're calling  
9 riparian buffers; is that correct?

10 A. Well, in terms of creating forested wetlands in the sense  
11 that you create a wetland where there wasn't a wetland  
12 before, that's correct. The only created wetlands are in  
13 Auburn. But along the Miller Creek riparian buffer,  
14 there are numerous areas where there are existing  
15 wetlands that are lawn, they're not forested, or they're  
16 houses on top of wetlands or there's landscaped gardens,  
17 and those areas will be forested areas once the  
18 mitigation plan is implemented.

19 Q. I did want to ask you about that. Let me ask you another  
20 question first. If you would look at page 11 of your  
21 prefiled, the bottom of the page, you refer to an Army  
22 Corps regulatory guidance letter. Do you see in  
23 paragraph 29, do you see that?

24 A. Which page.

25 Q. That's page 11 of your prefiled, paragraph 29, an Army

**AR 056829**

1 Corps regulatory guidance letter.

2 A. Yes.

3 Q. Now, that letter is still out for comment by interested  
4 agencies, isn't it?

5 A. I believe it is.

6 Q. Then if we could go on then to your prefiled testimony,  
7 page 15, paragraph 40. Are you with me?

8 A. Yes.

9 Q. You're talking, again, about what's being replaced  
10 currently, residential lawn, garden, nursery and so on.  
11 With regard to the residential lawns and gardens, do you  
12 know what the average age was of the residential lawns  
13 and gardens in question?

14 A. I don't know the average age, no.

15 Q. And are you aware of any inventory of the trees and  
16 shrubs that existed in those gardens and lawns?

17 A. I'm not sure exactly what you mean by inventory, but  
18 there is information on the composition of vegetation in  
19 much of that Miller Creek riparian zone. There is  
20 detailed parcel-by-parcel information on the existing  
21 vegetation.

22 Q. By inventory, I mean number of, for example, conifer  
23 trees.

24 A. I don't believe there has been a census of conifer trees.

25 Q. Census is probably a better word. Or the age of the

**AR 056830**

1 trees in those areas?

2 A. Not that I am aware of.

3 Q. And then looking down at your paragraph 41, you talk  
4 about, on line 14, the benefits, I think you're talking  
5 about what's going to be created and you call it  
6 predominantly forested -- do you see that?

7 A. Mm-hmm.

8 Q. Now, what do you mean by predominantly forested?

9 A. Well, I mean that more than half of it is forested, but,  
10 actually, I don't know the percentage, but most of that  
11 area that I'm talking about between Lora Lake and the end  
12 of the Miller Creek riparian corridor, so down to about  
13 here, the entire area from Lora Lake down to there would  
14 be mostly forested; there will be much more forest than  
15 any other type of plant community or vegetation. The  
16 only areas that are not forested are areas in the Vacca  
17 Farm where there will be shrub wetlands.

18 Q. If we wanted to know what you meant by forested, we would  
19 look at the planting plan specifics; is that correct?

20 A. You could look at the planting plans to know what I mean  
21 by forested, but there's a standard definition of a  
22 forested wetland which is that more than 30 percent of  
23 the canopy cover comes from woody trees, and this whole  
24 area will fit that definition once the mitigation is --

25 Q. If we want to know what the performance standard is here,

**AR 056831**

1           though, the specific performance standard as to what  
2           you're expecting to see in terms of forested comes from  
3           the planting plan, doesn't it?

4       A.   It comes from the planting plan and the performance  
5           standards in the mitigation plan.

6       Q.   Now, if you could look at the top of page 20 of your  
7           prefiled paragraph 54, and I'm looking particularly at  
8           lines 2 and 3.  Do you see where you say the peat soils  
9           on the Vacca Farm site are saturated to the surface even  
10          in late summer?

11      A.   Yes.

12      Q.   Now, is there some performance standard in the 401 that  
13          you can point us to that will maintain that condition?

14      A.   In the 401?

15      Q.   Yes, in the 401 certification.

16      A.   I don't believe there is a performance standard in the  
17          401 certification; however, there are performance  
18          standards for that mitigation site in the mitigation  
19          plan.

20      Q.   And is there a specific performance standard you can  
21          point to that would require that, as you have said is the  
22          case now, the peat soils in the Vacca Farm site be  
23          saturated to the surface even in late summer?

24      A.   I don't believe there's a performance standard that is  
25          phrased that way.  However, there are performance

**AR 056832**

1 standards that go to maintaining the plant community on  
2 that site, and the plant community that's planted in the  
3 area that's currently peat requires that type of  
4 saturation to be maintained. And the other thing is that  
5 much of the mitigation action and restoration action at  
6 the Vacca Farm site -- I would like to take a second to  
7 explain this because I think it's important. The  
8 existing hydrology on that site --

9 Q. I think I asked my question and I think you have answered  
10 it and gone beyond, so I will let your counsel take you  
11 even beyond that if he wants to.

12 I don't have any other questions.

13 MR. POULIN: None from CASE.

14 MS. COTTINGHAM: Any redirect?

15 MR. PEARCE: Just briefly.

16  
17 EXAMINATION

18 BY MR. PEARCE:

19 Q. Mr. Eglick asked you a question about the  
20 saturated-to-the-surface conditions at Vacca Farm, and  
21 you were explaining about, I believe, about how the plant  
22 community requires that type of saturation to be  
23 maintained. Could you explain that further to us?

24 A. Yes. The existing hydrology on that site maintains  
25 saturated soils into the summer in the peat areas in the

**AR 056833**



1 low parts of the site. That site has been drained.  
2 There are ditches in the site right now, there are tile  
3 drains that are there from the agricultural operation  
4 that were designed to dry out the soils so that it could  
5 be farmed. As part of the mitigation, those ditches and  
6 drains would be removed. There will be some grading as  
7 well which will lower parts of the elevation of the site,  
8 and those two things in combination will result, if  
9 anything, in wetter conditions on parts of that site.  
10 There is no reason to expect that those peat soils will  
11 be less wet than they are now.

12 In addition, the planting plan is composed of  
13 willows that typically require saturated soils for long  
14 periods of time into the growing season, and maintaining  
15 those plant communities on those sites are part of the  
16 performance standards. So plant performance standards  
17 maintaining the plant communities in areas where plant  
18 communities require very specific moisture regimes is an  
19 indirect performance standard for hydrology in my  
20 opinion.

21 Q. Thank you, Dr. Cassin. I don't have any further  
22 questions?

23 MS. COTTINGHAM: Any board questions?

24 MR. LYNCH: I have a couple questions.

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**AR 056834**

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EXAMINATION

BY MR. LYNCH:

Q. Hi, how are you today. I have a couple questions here just because you're here and there's a big map up there that you can help me remember something.

Does the headwater wetland in the Walker Creek basin, is that something that you can show me on that map?

A. Yes. I believe that's this wetland here, 43.

Q. Okay.

MS. COTTINGHAM: What did you call that?

THE WITNESS: Wetland 43.

Q. (Continuing By Mr. Lynch): And is that more than 10,000 feet from the third runway site?

A. I don't believe it is, but I don't know exactly, I'm not sure exactly how far that is. I believe it's within 10,000 feet.

Q. I don't need you to stand anymore. Thank you.

I guess my last question to you is, is the out-of-basin mitigation that's being proposed, when you compare that to what could have been achieved by doing more in-basin mitigation -- if there was more in-basin mitigation that was done, is the out-of-basin mitigation more effective at replacing and improving the wetland functions impacted by the project? That's a long

**AR 056835**

1 question, but --

2 A. From my understanding of the mitigation opportunities  
3 that might be present in basin, other than the ones  
4 proposed by this project, most of those are relatively  
5 small wetlands and they're surrounded by urbanized areas,  
6 as you would expect. Those types of mitigation sites are  
7 generally not as sustainable over the long term because  
8 they are surrounded by an urban environment.

9 The Auburn mitigation site is designed to replace  
10 the functions impacted by the project, including some of  
11 the wildlife habitat that can't be restored near the  
12 airport. And it's also a large wetland site, so it's a  
13 large area of habitat. It has large buffers around it  
14 because there was a large piece of property to work with.  
15 It's currently not in an urbanized environment. One edge  
16 of it is along the Green River.

17 So, in my opinion, it's more sustainable and more  
18 viable as a long-term wetland site than some of the small  
19 isolated areas that were apparently potential mitigation  
20 opportunities in basin. So, yes, I think the long answer  
21 to your question is yes.

22 Q. It was a long question. Thank you. No more questions.

23 MS. COTTINGHAM: Any questions as a result of  
24 the board's questions?

25 MR. PEARCE: No.

**AR 056836**

1 MR. EGLICK: No.

2 MS. COTTINGHAM: You're excused. Thank you.

3 MR. PEARCE: If we'd like to get started with  
4 Dr. Kelley, he is going to take a lot more than ten  
5 minutes, or do you want to start ten minutes early  
6 tomorrow? I don't know what the board's wishes are.

7 Would it be appropriate to turn off the clock now?

8 MS. COTTINGHAM: You may turn off the clock.  
9 We have two witnesses by the port in the morning and  
10 potentially four rebuttal witnesses. Are you still with  
11 those four, Sheldon, Rozeboom, Lucia and Wingard?

12 MR. STOCK: Yes, although not necessarily in  
13 that order. It may be that Dr. Lucia will go first. He  
14 came in to California and now he is flying up from  
15 California, and I don't know whether he is coming tonight  
16 or tomorrow morning, but if he is here, we'll be putting  
17 him on first.

18 MS. COTTINGHAM: How much time do we expect on  
19 your two direct witnesses?

20 MR. PEARCE: If I had to do him right now, I  
21 would expect 45 minutes for Dr. Kelley, and if I had to  
22 do him in the morning, probably 30. And I'm not sure how  
23 much we have for Mr. Bailey. He would be less than a  
24 half hour, probably 20 minutes for us.

25 MS. COTTINGHAM: Okay.

**AR 056837**

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MR. PEARCE: We have another hour of direct at the most and, of course, that didn't count any cross examination of those two witnesses. I don't think it's going to take us an hour, actually, to get both of them.

MS. COTTINGHAM: Why don't we adjourn for the day and why don't we start at 9 o'clock tomorrow morning, does that work for you? We'll start at 9 tomorrow morning just to give us an extra half an hour.

MS. COTTINGHAM: And how much time -- did you start the clock over after noon?

MR. POULIN: Yes, we did. We reset the clock at noon and the time elapsed since then for appellants, one hour, nine minutes, 41 seconds; for respondents, two hours, one minute, two seconds.

MS. COTTINGHAM: Thank you. And with that, we'll go off the record and see you tomorrow morning.

(Hearing adjourned at 4:50 p.m.)

**AR 056838**

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C E R T I F I C A T E

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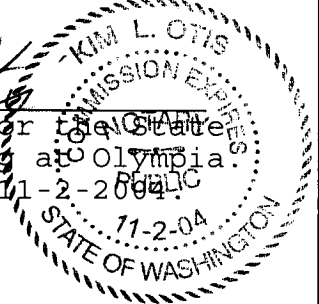
COUNTY OF THURSTON )

I, Kim L. Otis, a duly authorized Notary Public and Certified Court Reporter in and for the State of Washington, residing at Olympia, do hereby certify:

That the annexed and foregoing Transcript of Proceedings, consisting of pages 9-0001 through 9-0232, was reported by me and later reduced to typewriting by means of computer-aided transcription; that said transcript as above transcribed is a full, true and correct transcript of my machine shorthand notes of said proceedings heard on the 28th day of March, 2002, before the Pollution Control Hearings Board.

WITNESS MY HAND AND OFFICIAL SEAL this 10th day of May, 2002.

*Kim L. Otis*  
Notary Public in and for the State of Washington, residing at Olympia.  
My commission expires 11-2-2004.



Kim L. Otis  
Washington CSR No. OTIS\*KL441C9  
GENE BARKER & ASSOCIATES, INC.  
406 Security Building  
Olympia, Washington 98501

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