BEFORE THE POLLUTION CONTROL HEARINGS BOARD

STATE OF WASHINGTON

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| AIRPORT COMMUNITIES COALITION,<br><br>Appellants,<br><br>CITIZENS AGAINST SEA-TAC EXPANSION,<br><br>Intervenor/Appellant,<br><br>vs.<br><br>DEPARTMENT OF ECOLOGY and the PORT OF SEATTLE,<br><br>Respondents. | PCHB No. 01-160 |

TRANSCRIPT OF PROCEEDINGS

DAY FOUR

March 21, 2002
Lacey, Washington

ORIGINAL

Betty J. Koharski
Certified Court Reporter
WA CCR KOHARBJ619BN
GENE BARKER & ASSOCIATES, INC.
203 Fourth Avenue South East Suite 406
Olympia, Washington 98501
(360) 943-2693

BE IT REMEMBERED that the above-entitled matter came on for hearing before the Pollution Control Hearings Board, Day One commencing on the 18th day of March, 2002, and continuing through Day Ten, the 29th day of March, 2002. The hearing was conducted at the Environmental Hearings Office, 4224 6th Avenue SE, Rowe Six Building 2, Lacey, Washington.

Sitting as the Washington State Pollution Control Hearings Board were KALEEN COTTINGHAM, presiding, ROBERT V. JENSEN, Board Chair, and BILL LYNCH, Member.

## A P P E A R A N C E S

For the Appellant Airport Communities Coalition:

PETER J. EGLICK,
KEVIN L. STOCK,
MICHAEL WITEK,
Attorneys at law
HELSELL FETTERMAN
1500 Puget Sound Plaza
1325 Fourth Avenue
Seattle, WA 98111

RACHAEL PASCHAL OSBORN,
Attorney at Law
2421 West Mission Avenue
Spokane, WA 99201

For the Intervenor Citizens Against Sea-Tac Expansion:

RICHARD A. POULIN,
Attorney at Law
SMITH & LOWNEY
2317 E. John Street
Seattle, WA 98112

# APPEARANCES

For the Respondent
Department of Ecology:

JEFF B. KRAY,
JOAN MARCHIORO,
THOMAS J. YOUNG,
Assistant Attorneys General
OFFICE OF THE ATTORNEY GENERAL
P.O. Box 40117
Olympia, WA 98504-0117

For the Respondent
Port of Seattle:

GILLIS E. REAVIS,
Attorney at Law
BROWN, REAVIS & MANNING
1191 Second Avenue Suite 2200
Seattle, WA 98101

ROGER PEARCE,
STEVEN G. JONES,
Attorneys at Law
FOSTER, PEPPER & SHEFELMAN
1111 Third Avenue, Suite 3400
Seattle, WA 98101

# I N D E X

# I N D E X

# E X H I B I T S

| NUMBER | DESCRIPTION | IDENTIFIED | ADMITTED |
|---|---|---|---|
| No. 360 | Letter dated 2/11/02 to Richard Poulin from Analytical Resources re Case 1 | 4-0121 | 4-0123 |
| No. 361 | Letter dated 2/11/02 to Richard Poulin from Analytical Resources re Case 2 | 4-0121 | 4-0123 |

March 21, 2002

Day Four

MS. COTTINGHAM: We'll go on the record.

We have been joined this morning by Betty Koharski, as our court reporter.

The first thing I would like to take up this morning is the motion in limine to exclude the testimony of Dave Garland. I was planning to do it without oral argument.

MR. EGLICK: I wasn't going to offer argument on that. We have a related matter and I didn't know whether I should bring that to your attention first, because it may have some relationship, it's a motion that we're going to make as a preliminary matter this morning.

MS. COTTINGHAM: Why don't you go ahead and state the motion before I indicate my response on the earlier motion.

MR. EGLICK: We have realized in light of the order of testimony that's now been offered yesterday that this is something that is going to come up - we wanted to bring it to your attention as early as we could - and that is that there is an additional two items of testimony that relate to the low-flow plan and exhibits to that testimony that should be excluded and that fall squarely within the

terms of the order that the Board entered with regard to the deadline for reports and plans being produced, and that's by February 1, and that we think they very clearly violated here. They relate to the low-flow plan, so I thought that was something we should bring to your attention this morning.

MS. COTTINGHAM: Have you put your motion in writing or were you going to make it orally?

MR. EGLICK: I was going to make it orally.

MS. COTTINGHAM: Have you had some discussions with the opposing counsel?

MR. EGLICK: No. We just became aware of quite the depth of what was going on. Mr. Stock went back to the office by happenstance yesterday evening and found that some documents had been sent to us there by Ecology that kind of brought into focus what's been going on. So I just got them this morning, and I can explain further when the Board would like, I think it is something that the Board is going to want to hear about.

MS. COTTINGHAM: Is it necessary to make a ruling before the noon hour on this matter?

MR. EGLICK: I don't think so, no.

MS. COTTINGHAM: Would it be appropriate or acceptable for you to have some discussions with opposing counsel what the nature of the motion is, so that they're

not caught by surprise?

MR. EGLICK: That would be fine. We were caught a little by surprise ourselves last night, once we realized what was going on, but I would be happy to --

MS. COTTINGHAM: Would you do that over the lunch hour and then we'll hear the motion after we come back from the lunch break.

MR. EGLICK: Okay. Then I assume we'll take up the motion then as a first matter after lunch?

MS. COTTINGHAM: Mm-hmm.

MR. EGLICK: Thank you.

MS. COTTINGHAM: As you know, the ACC entered a motion in limine to exclude the testimony of Dave Garland. After reviewing all of the material submitted, here is my order partially granting the motion in limine.

First of all, in the ruling that I made yesterday on the late-produced reports, I stated that the operative intent of the prehearing order and as evidenced by the transcript was to prevent the late presentation of those formal aspects of the 401 conditions. In the instant motion, the March 6 report prepared by Dave Garland on the December 2001 flow plan was not a report prepared or expected to be prepared pursuant to the 401 certification or, accordingly, failure to produce this report by the February 1st deadline was not a violation of the

prehearing order.

Next, discovery in this case has been governed in part by the basic discovery rules, including CR 26(e)(1)(B), the duty to supplement interrogatory responses regarding subject matter of expert witness testimony. In this matter, ACC made a series of written and in-person inquiries to Ecology's counsel to determine whether Mr. Garland would testify with regard to the December 2001 low-flow plan. Ecology made no response. Ecology even failed to respond to ACC's letter of March 4th requesting to depose Mr. Garland in advance of hearing regarding the review of the low-flow plan. This refusal of Ecology to respond in any clear manner is a violation of the fundamental duty under the civil rules of discovery requiring a party to supplement and update information it has provided. Normally, the remedy would be to allow additional time for ACC to depose Mr. Garland on the December 2001 low-flow plan. However, in this case, as it's already developed, ACC's three key expert witnesses, Mr. Rozeboom, Dr. Leytham and Dr. Lucia, have already testified. In presenting its case, ACC has stated its need to obtain analysis from these experts, on Mr. Garland's review, within the framework of their professional schedules and obligations. Since ACC carries

the burden of proof in this matter, the additional burden of this violation is especially egregious and prejudicial. This means more time will not be a sufficient remedy. Therefore, the remedy for this discovery rule violation will be the exclusion of any testimony by Mr. Garland on any analysis, findings or conclusions related to his review of the December 2001 flow plan. Mr. Garland will be able to testify on any subject upon which Appellants had the opportunity to depose him. Any reference to the excluded subject matter shall constitute the basis for an objection, which the Board will sustain when asserted.

And I have copies of this written order. Again, this will not be mailed out, so I am hopeful that it gets distributed to all of the attorneys.

Are there any questions?

With that, ACC can start the day with its witnesses.

MS. OSBORN: Thank you.

ACC recalls Dr. Peter Willing.

Ms. Cottingham, we have some illustrative exhibits. May I approach and provide these to the Board?

(Documents handed to Board).

MS. COTTINGHAM: Mr. Jensen, since you weren't here yesterday morning, you should know that there were some exhibits that were for illustrative purposes.

The one on top is a replacement, however.

MS. OSBORN: That's correct. It's a replacement page for Exhibit F of Dr. Leytham's testimony.

MS. COTTINGHAM: Of his prefiled testimony.

MS. OSBORN: The other three documents are illustrative exhibits.

MR. JENSEN: Okay.

MR. REAVIS: Ms. Cottingham, before we get started, would it be possible for you to ask some of the ACC's attorneys who are not participating in Mr. Willing's or Mr. Wingard's presentation, to talk with some of the attorneys who are not participating in Mr. Willing's or Mr. Wingard's response, so we know a little further in advance what the nature of the motion is that they want to bring about excluding documents?

MS. COTTINGHAM: Yes. There may be the availability of the conference room out there, so you'll need to check to see if it's obligated.

MS. OSBORN: As an initial matter, I would like to point out that it is Dr. Willing and we would appreciate it if he was referred to by that title.

MS. COTTINGHAM: Okay.

Have you started the clock yet?

MR. POULIN: It has been started.

MS. COTTINGHAM: Thank you.

You're still under oath from yesterday.

CONTINUING EXAMINATION

BY MS. OSBORN:

Q Good morning.

We left off yesterday talking about water quality violations with respect to the Port's current stormwater discharges, is that right?

A Yes, we did.

Q We have provided to the Board and the parties copies of an illustrative exhibit that is composed of four pages starting with outfall TR copper de-icing report. Did you prepare this exhibit?

A I did.

Q Could you explain to the Board what the two graphs or charts in this exhibit contain?

A Logically, it's easier to start with the second page back, which is a series of numbers based on Exhibit 1128, page 6-2. What I did was I simply tore out the numbers from the Port's compilation of the copper concentrations from the de-icing study. And the table contains the data that's plotted on the sheet on the front.

And you can see from the graph on the front that the concentrations are above what the criterion for copper concentrations would be at a hardness value of 50 milligrams per liter and 25 milligrams per liter, so you can see the effect of a changing hardness value on

this criterion, and you can see that there's a relatively small number of values here and more than half of them are above the criterion line that you would establish if you had 50 milligrams per liter of hardness.

Q And the third page in your illustrative exhibit?

A The third page is also based on data from the Port. The accompanying table is not included but you can see the data it came from, if you look at exhibit --

Q Are you looking for the stormwater plan?

A Yes, I am.

Q It's Exhibit 1213. Do you have it there?

A No, I'm sorry. What I'm looking for is the annual stormwater monitoring report, which is Exhibit 6.

And page 93 of that exhibit contains a compilation of data, it's the middle of compilation of data that pertains to Port outfall SDS 3.

Q Would you hold for moment until the parties can find it. Please repeat the page number.

A The page number is 93.

MS. COTTINGHAM: Which exhibit?

A Exhibit 6. You see at the bottom of that page that the stations identified are in the sample data column. The second column in indicates changes SDS 2 to SDS 3, and the series of data that I have plotted here has the last three values on page 93, it contains all of the values on

page 94, and continues on page 95. So those are the source data for the graphic that you have in my illustrative exhibit.

Q And what does the graphic show?

A The graphic shows the dispersion of copper values and the corresponding acute water quality standards at a range of different hardnesses, again, this one going up to 100 milligrams per liter, starting at 25. It does show that many of the values are quite a number of times the concentration indicated by the criterion, 58 values I believe is the number, that are scattered over time from 1994 to 2001.

The import of these numbers is that SDS 3 has some quite high values for copper, and the probability of their being able to meet the water quality standards in the receiving water is correspondingly low the higher the number goes. I might point out one thing about this graph and that is that the copper concentrations are stated in terms of total recoverable, because that's the criterion that is established in the Port's discharge permit, the NPDES permit. I have taken the liberty of adjusting the criteria on this graph to show the total recoverable as opposed to dissolved metals concentration, which is the terms in which the water quality standard is stated in the Washington Administrative Code.

Q Thank you.

In your prefiled testimony, you also discussed the topic of BMPs for water quality treatment. Could you summarize your testimony on that point for the Board?

A Yes. It may be useful to refer to the stormwater management plan, which is Exhibit 1213, and Table 4-6 in that plan.

Q Yes. That table is contained on the fourth page of your illustrative, is that correct?

A This is the back page of my illustrative exhibits, yes, this page is taken directly out of the stormwater management plan.

MS. COTTINGHAM: What volume is 1213 in?

MR. PEARCE: It is in Volume 16 of the yellow binders. This may be one of the exhibits because it is so large that the ALJ asked us to produce just one copy for the Board. It's a multi-volume.

MS. COTTINGHAM: We don't have them up here, just so you know.

MS. OSBORN: The table that we will be utilizing from this exhibit is actually produced as a part of the illustrative, so if the Board is satisfied with looking at that table, it is copied directly from Exhibit 1213.

A (Continuing) And you will see that this version is dated July 2001, down in the lower right-hand corner. It was

revised a number of times and I believe this is the latest one that I have, there may be a subsequent one but I think it's relatively late in the game.

If you look down the left-hand column you see SDS 3 is identified there, and the corresponding existing treatment best management practices are identified in the third column. This basin is significant because it is one of the largest basins, in fact I think it's the largest basin, almost half of the total that shows up on this page, 234 acres, so it's a large part of the total. And it's also significant because the Port has referred to it as the model for what the new runway will look like and how it will perform in terms of water quality, similar quality.

The existing treatment best management practices there are shown as filter strips, and in fact the area of filter strips is 1,680,000 square feet, which translates to approximately 38 acres, if I've done my arithmetic right. This is the predominant best management practice for one of the biggest outfalls on the airport. There are a few other minor source control best management practices that have to do with sweeping and spill control plans, et cetera, that are shown in the right-hand column, but the preeminent method that the Port is resorting to to deal with this stormwater is the filter strip for this basin.

You can see the filter strip recurrence on the other basins in fairly large proportions of the acreage.

Q And what do you conclude from this information?

A When I hold this information in one hand and the previous page in the other, it seems pretty evident that there is a water quality problem, even with the one criterion that I'm emphasizing here, which is copper. There is a manifest problem with the quality of the stormwater that's coming from this basin, and the Port has announced the intention to continue with this same best management practice in preference to adopting some of the more sophisticated and more thorough best management practices that are recommended by the King County Surface Water Design Manual, the Department of Ecology manual that has just been produced, and in fact the fairly elaborate list of best management practices that was incorporated in the 1998 401 water quality certification. For some reason that I do not understand, those best management practices were dropped out of the later 401 water quality certifications that had a relatively sophisticated multibarrier approach to dealing with the pollutants in storm water.

Q One last question for you. Do we know where the copper is coming from?

A I do not.

Q Has there been speculation about that?
A Yes, there has.
Q Do you recall?
A Yes. My recollection --
MR. PEARCE: Objection to the witness presenting speculation.
MS. COTTINGHAM: Would you lay a foundation.
MS. OSBORN: Certainly.
Q Dr. Willing, have you reviewed depositions that ACC conducted of Ecology witnesses?
A Yes, I have.
Q And did Ecology witnesses discuss where the copper might be coming from with respect to the Port's stormwater discharges?
A Yes, they did.
Q And what did they say?
A I'm not able from my memory to tie it to exactly which witness or which document I've read it, but I've seen speculations that it has come from rubber in vehicles and it's obviously coming from an airfield basin, so there was some speculation about how that could happen.
MS. OSBORN: Thank you. That's all of the questions I have.
MS. COTTINGHAM: Mr. Poulin.
MR. POULIN: Thank you.

EXAMINATION

BY MR. POULIN:

Q Dr. Willing, you've emphasized the discharge basin that drains through the outfall called SDS 3, is that right?

A Yes.

Q I would like you to look at an exhibit, Exhibit 425, the Port's Storm Water Pollution Prevention Plan.

MS. COTTINGHAM: What number, 425?

MR. POULIN: Number 425. And towards the very back of that exhibit - I'm not sure if he has a copy - behind the appendices there's a foldout figure, it looks like this.

MS. COTTINGHAM: How far back?

MR. POULIN: It's almost the last page of the exhibit, in fact it may be, the pages aren't numbered.

MS. COTTINGHAM: Our versions aren't foldout.

MS. OSBORN: Is that Figure 1?

MR. POULIN: Yes, it is Figure 1. Do you have a smaller copy?

MS. COTTINGHAM: It's the second to the last page.

Q (Continuing) Could you please show us where SDS 3 and the drainage basin for that outfall are?

A There's a lightly shaded area in the middle on the west side of the airport property that is indicated as SDS 3

on the map. That whole basin is SDS 3, this is the 300-some-odd acres that I was referring to.

Q So which outfall do the --

A I'm sorry, 234 acres that I was referring to.

Q Which stormwater outfall is the primary discharge point for the runways at SeaTac airport?

A I believe that would be SDS 3.

Q And to your knowledge, will SDS 3 also drain the third runway, if that's built?

A I believe it would, yes.

Q Now, you've talked about BMPs. Which BMPs are used to treat the discharge at SDS 3?

A My last table in my illustrative exhibit shows that SDS 3 is filter strips consisting of 1,680,000 square feet.

Q Are those filter strips already in place?

A They're shown as existing water quality treatment, yes.

Q So the discharges from SDS 3 have already gone through filter strips, is that right?

A That's my understanding, yes.

Q So they've already been treated with SBMP?

A They've already had the benefit of whatever treatment they would receive with SBMP, yes.

Q Have you reviewed the annual stormwater monitoring reports that the Port produces under its NPDES permit?

A Yes, I have.
Q Have you reviewed Exhibit 6, which is the September 2001 annual stormwater monitoring report?
A Yes, I have.
Q Does Exhibit 6 have information about the discharges from SDS 3?
A Yes, and some of these numbers are the ones that I was basing the graph in my illustrative exhibit upon. The third page of my illustrative exhibit comes from this exhibit.
Q That's this spread chart?
A Yes.
Q What would you call that, a scatter plot?
A Yes, it's a time-series plot of copper concentrations.
MR. POULIN: I have a demonstrative or illustrative exhibit that I've shared with opposing counsel that I would like to present to the Board.
Q And, Dr. Willing, the annual stormwater report includes appendices, does it not?
A Yes, it does.
Q And can you find the specific discharge information in those appendices?
A Yes, if you're persistent.
Q Would you please look to page 105 of Exhibit 6, and you'll see page 105 is a table. Can you tell us what information

is presented on this table in the first rectangle that is labeled "all outfalls"?

A Yes. This is a statistical compilation, it's labeled NPDES Composite Statistics from 1994 to 2001, and the top box there shows all outfalls, the number of samples, and a breakdown according to different statistical categories, showing everything from the 95th percentile down to nondetects, which would be a sample that shows no concentration of the parameter in question.

Q Is it your understanding that this table shows all 387 stormwater samples that the Port has taken from 1994 through the indicated date, June 30, 2001?

A That's the way I would interpret it, yes.

Q And the copper results are reported in the column that's third from the right?

A Yes.

Q Now, just to cut to the chase, I have excerpted that information here in the left column, all outfalls. Similar information from page 110 of Exhibit 6, pertaining to what's called the airfield outfalls, which are the four identified outfalls listed here. And then in the third column information from yet a third page, 106, that shows the information only for SDS 3. And just to save us the trouble of flipping back and forth through those three pages of the annual stormwater monitoring report, I've

pulled those together here on this demonstrative exhibit.

Can you draw any conclusions about how the airfield outfalls compare to all of the outfalls, from this information?

A Given a minute or two I probably could, yes. It's hard to do a statistical analysis on the fly here, which is what I would be attempting to do here.

I'm looking at the median values, you know, this is the first thing that my eye would be attracted to, and comparing all of the outfalls versus the airfield only versus SDS 3, the numbers do appear to increase there. I'm not sure that I would attach much significance to a shift between 24 parts per billion, 27 parts per billion, and 29 parts per billion. It looks like there's an increase there; if it were more striking I would tend to attach more significance to it. I did not do the statistical analyses, I have not had the opportunity to verify them.

Q Well, these numbers that are reported by the Port are statistical analyses, aren't they?

MR. PEACE: Object. No foundation. The witness said he didn't do them.

MS. COTTINGHAM: You're going to have to lay a foundation, counsel.

Q (By Mr. Poulin) Well, could you briefly explain how the

table indicates -- well, what is a 95th percentile?

A Well, 95th percentile, as I would understand it, would be the value below which 95 percent of the other values would fall.

Q And five percent would be higher?

A Yes. So in the case of 95th percentile, I tend to think in terms of micrograms per liter instead of milligrams per liter, so you have 83 micrograms versus 82 micrograms versus 91 micrograms for SDS 3.

Q And the 25th percentile, how does that work?

A The 25th percentile would be a relatively low value, in other words, only 25 percent of the values would be below that number in each case, and you go from 15 micrograms to 18 micrograms to 22 micrograms in the case of SDS 3.

Q And are the SDS 3 discharges of copper higher in the 25th percentile than any of the other categories?

A They appear to be, yes.

Q Okay. The acute criteria for water quality as calculated by the Port, that's indicated here as 10.3 micrograms. How do these discharges compare to that calculated few criteria?

A Well, it looks as though everything -- in most cases, everything above the 25th percentile would be in excess of the criterion.

Q So that's at least three quarters of the sample?

A Yes. There's another big assumption built into this, and that appears that they've calculated at 56 milligrams per liter hardness. And again you can see the effect of that by looking at some of my illustrative exhibits which show what happens to the criterion when you raise it from 25 milligrams per liter of hardness to 50 milligrams per liter of hardness.

Q Now it's true that these are samples of the outfall rather than the receiving waters, is that right?

A Yes.

Q Have you reviewed any information about the water quality in the receiving water?

A Yes, I have.

Q Have you reviewed the 1997 receiving environment monitoring report, that is, Exhibit 426?

A Yes, I have.

Q Are you familiar with its conclusion that copper criteria are exceeded in both Miller and Des Moines Creek?

A Yes.

Q Is there significance to that fact, given that these discharge data show that the outfall includes copper that exceeds the state criteria?

A Yes. I think the Storm Water Receiving Environment Monitoring Report is an interesting document because it's one of the few places where I have seen a compilation of

data based on the receiving waters themselves. The Port has avoided publishing regular data that indicate what's going on in the streams, and this is one of the concerns that I expressed yesterday when I mentioned this report in my testimony.

Q And so far as you know, does the Port have a mixing zone authorized for stormwater discharges under its permit?

A My understanding is that the only mixing zone authorized under the Port's NPDES permit is for their industrial wastewater discharge, so they have one mixing zone in Puget Sound, if I understand it correctly.

Q But not in the local creeks?

A My understanding is they do not have mixing zones authorized for their individual stormwater discharges.

Q So is the Port entitled to rely on dilution to help deal with the discharges?

MR. PEARCE: Object. No foundation for what "dilution" means.

MS. COTTINGHAM: Sustained.

Q (By Mr. Poulin) Without a mixing zone, where is the Port required to comply, where is the compliance point for a discharge?

MR. YOUNG: Object. Calls for a legal conclusion.

MS. COTTINGHAM: Sustained.

Q (By Mr. Poulin) Let's shift gears, Dr. Willing.

Did you participate in the first site visit that ACC took?

A Can you refresh my memory what the date was?

Q I believe it was Monday, January 28th of this year.

A Yes, I did.

Q And on that site visit, did you participate in taking water quality samples?

A Yes, I did.

Q I would like to have you look at two exhibits, Exhibit 360 and 361.

Now, while we are getting those exhibits, I'll acknowledge that there's a pending hearsay objection, and at present I'm simply offering these for background context, Exhibit 360 and 361.

MS. COTTINGHAM: So you're not waiving your earlier hearsay?

MR. POULIN: It wasn't my objection. Just trying to save time.

Q So are you aware, Dr. Willing, that the samples taken on the site visit were sent to a lab for analysis?

A Yes.

Q You're aware that laboratory analysis was reported back?

A Yes.

Q Okay. Let's look at Exhibit 358.

A Yes.
Q Could you tell us what Exhibit 358 is, please?
A Exhibit 358 is a small spreadsheet that I developed to show the water quality criteria at the hardness values that were indicated by the lab results, to show what the metals criteria would have been at those hardness values.
Q So you created this table?
A I did.
Q And you indicate hardness values of water quality samples in column three, is that right?
A Yes. Those are the values for hardness that were derived from those particular samples, and then the water quality criteria, water quality standards are in the right-most column. So just for an example, the first value would be 19 for copper freshwater acute, and the water quality standard for that hardness would be 3.6 micrograms per liter.
Q Okay. And let's also turn to Exhibit 379, which is a one-page e-mail. Would you describe what that is, please?
A I don't think I have that one.
(Document handed to witness).
Q What is this exhibit for e-mail?
A This is a copy of an e-mail that I wrote to Dr. John Strand, reporting to him the results of the turbidity samples that we took in the field that day.

Q And what do those results indicate to you?
A Well, they show what I refer to as the tank farm outfall, which I believe is SDS 1, had a turbidity of 281 nephelometric turbidity units. And the value for Des Moines Creek, right next to the outfall or a little bit above it, was 31 nephelometric turbidity units.
Q Is there any significance to that change?
A Yes. There's almost a tenfold, a ninefold increase between the turbidity value for the creek and the turbidity value for the outfall. We did two samples, there are two sets of numbers there, the second was 299 NTU for the outfall and 31.2 NTU for the creek.

MR. POULIN: I have no further questions.

MS. COTTINGHAM: Mr. Young or Mr. Pearce, time for cross.

MR. PEARCE: I think I'll go first. Thank you, Your Honor.

EXAMINATION

BY MR. PEARCE:

Q Good morning, Dr. Willing. My name is Roger Pearce and I represent the Port of Seattle in this matter.

I believe you said you're a principal of the Water Resources Consulting, is that what your testimony states?
A Yes, sir.

Q How many employees there?
A There are no employees.
Q Just you?
A That's correct. I make use of other people's talents on the basis of contracts.
Q Thank you. Have you ever designed a storm water manual system for a construction project?
A No, I haven't.
Q I see you've provided some opinions about water quality criteria. Those are the numeric criteria for metals, isn't that correct?
A That's correct, yes.
Q Let's talk about the criteria and use copper for an example. What's the difference between the acute standard and the chronic standard?

MR. POULIN: Objection. Would it be possible to put the water quality standards in front of Dr. Willing?

MR. PEARCE: I just want to know generally from the witness, I don't want the number, I want to know generally if he knows what the difference is.

MS. COTTINGHAM: Why don't you state the question differently.

MR. PEARCE: Okay.

Q In general, what's the difference between acute criteria

and chronic criteria for a metal such as copper?

A You would have to forgive me, but I really would feel more comfortable if I did have the relevant statute in front of me.

Q It's a copy of WAC 173-201A.

MR. POULIN: It's also Exhibit 5.

MR. PEARCE: Do you want to refer to Exhibit 5?

MS. COTTINGHAM: Although it's noted as Exhibit 5, as a reminder, the Board will take judicial notice of all of the relevant WACs and the statutes.

MR. PEARCE: I think it's just there for the parties' convenience.

MS. OSBORN: Ms. Cottingham, could we go off the record for about one minute?

MS. COTTINGHAM: We can go off the record and stop the clock. We've had a little minor disaster, a little water quality problem, actually a water quantity problem.

(Pause in proceedings).

MS. COTTINGHAM: Are we ready to go back on the record?

You may start the clock and go back on the record.

Mr. Pearce.

MR. PEARCE: Thank you, Your Honor.

Q I'll ask the question this way. Is the acute standard for

copper a one-hour average? Would it be 173-201A-040, the table there?

MR. POULIN: Could counsel identify which table?

MR. PEARCE: The table at -040.

MS. OSBORN: There's two.

MR. PEARCE: I think it's actually -- I just see the one that says substances, the toxics substances, and copper for freshwater acute refers you to footnote (o) and footnote (c).

Q Would you look at footnote (c). It says that's a one-hour average concentration, is that correct?

A Yes.

Q And how about for the chronic standard for copper, that refers you down to the footnote (d), and that's a four-day average concentration, is that correct?

A Yes.

Q How do you derive a four-day average?

A Well, that means just what it says, as I understand it, you would have to have an undetermined number of samples taken over a four-day period that would yield individual values and then you would take an average of them.

Q Do you know how many samples you need?

A I would come up with some sort of a statistical basis for a statistically sound number of samples that I think would provide a convincing illustration of what's going on

during a four-day period.

Q Do you know what the Department of Ecology requires?

A No, I don't.

Q What's the difference -- without reference, you don't have to refer to the table. What's the difference between the total dissolved amount of metal in freshwater and the total recoverable amount?

A It might be no difference at all.

Q What's the difference in theory?

A The dissolved fraction of metal is ascertained by running a water sample through a filter, typically a point 45 micron filter, in other words, you strain out all of the chunks and what goes through the filter presumably contains nothing more than very fine colloids and dissolved forms of the constituents. And then you analyze what's left on the filter, the chunks that stay on the filter -- they're not very big chunks if they're down to point 45 microns, you analyze what goes on the filter and what goes through the filter separately, and the total recoverable doesn't go through this filtration step, it just analyzes by plasma spectroscopy is the term, it's the current standard analytical technique for finding out what's in the sample. How you treat the sample first is really a matter of filtration, so if you want to know what the dissolved fraction is, you have to filter it first; if

you don't care, you just want to know what the total is, then you analyze the sample without going through the filtration step.

Q In a stream that has an amount of dissolved organic carbon or other lignins in it, is total dissolved typically smaller than total recoverable?

MS. OSBORN: I would object to the form of the question.

MS. COTTINGHAM: Would you restate your question, please.

MR. PEARCE: What was the objection?

MS. OSBORN: To the form of the question. Use of the term "typically," a little vague.

MR. PEARCE: Well, these types of questions to things that can counsel doesn't understand, we waste a lot of time, Your Honor. If the witness understands it, I think it might be more appropriate to ask the witness if he understands it.

MS. COTTINGHAM: Why don't you restate the question.

Q (By Mr. Pearce) In your experience, is the total dissolved amount in a freshwater sample less than -- what percentage of the time is the total dissolved sample less than the total recoverable?

A I would not be able to answer that question on a general

basis. One of the things that's very variable is the breakdown between dissolved and total recoverable or dissolved and particulate bound. You want to look at the two fractions independently.

Q Because that's very variable dependent on the water?

A Yes, dependent on a lot of things.

Q What are those things other than constituents in the water?

A It would depend on what kind of a watershed it is, it would depend on what the input of the water source is, where is the water coming from, is it direct from rainfall, what has it run through on its way to get to the sample point, what sort of biological processes have happened in between, you know, there's quite a list things that could affect it.

Q I understand we're talking about a site specific test, which is running it through a sieve, is that correct?

A Well, a sample would be taken in a given known place identified to that location.

Q Do you need to have that information to determine what total dissolved is, what the total dissolved concentration of the metal is?

A I'm not sure I follow your question.

Q Do you need to perform that analysis before you know what the total dissolved concentration of the metal is, rather

the total recoverable?

A Which analysis are you talking about?

Q We just talked about an analysis where you would run the water through a very fine sieve, as I understand it?

A Yes, that will do for explanatory purposes, yes.

Q For my layman's purposes, thank you.

Do you have to do that test in order to find out what the total dissolved fraction is as opposed to total recoverable?

A The way the modern water chemistry business works, you define the dissolved fractions as the part that goes through a filter of point 45 microns.

Q Okay. Are the Washington numeric water quality standards, in your understanding, are they for total dissolved metal concentrations?

A I believe they're not, no. They're stated in terms of dissolved concentrations, which you can see in one of the longer footnotes here. This is set up a little differently from the copy that I'm used to using, so it's hard to find things that quickly, but I believe that footnote (dd) on page 482 states that these ambient criteria on the table are for the dissolved fraction, and then it goes into some explanation about how that's applied.

Q So to be clear -- I thought that is what I asked, I'm

sorry if I was unclear. The standard is for the dissolved fraction?

A Yes.

Q Okay. What is hardness as applied to freshwater?

A Hardness is basically the ability to consume, in other words, that's where the term came from, hard water requires more soap to do the job than soft water does. In practical analytical chemistry terms, it's the sum of the calcium and magnesium in the water, that's the way you measure it. A limnologist would tend to think in terms of alkalinity as opposed to hardness, which is a little bit different metric, but the water quality standards are stated in terms of hardness, so it's the sum of the calcium and magnesium concentrations in the water that adds up to a value known as hardness.

Q And the water quality criteria for metals, let's just say copper, actually varies as the hardness in the water varies, does it not?

A Yes, it does.

Q And can the hardness in a stream that's less than two cubic feet per minute vary during a rainfall event?

A Yes, it can and it does. This is one of the things I tried to illustrate by my illustrative exhibits here is that the hardness does vary, it can vary over a fairly short amount of time and a fairly short amount of

distance.

Q About how much can it vary relatively; can it double, triple, or conversely can it, you know, be lowered by three times than what the original hardness was during a rainfall event?

A I hesitate to put bounds on it without having a specific data series in front of me, but it can certainly vary by -- you know, it can certainly double and triple.

Q Okay. So just to sum up here, for the components of the acute standard, it includes a one-hour average concentration, correct?

A Yes.

Q For copper?

A If you're referring to footnote (c) in the back, that specifies the one-hour average concentration, yes.

Q And it's for the total dissolved fraction, correct?

A Yes.

Q And it's a function of hardness, we need to know the hardness in order to tell what our standard is?

A Yes, we do.

Q And it applies in receiving water, correct?

A Yes.

MS. OSBORN: Objection.

MS. COTTINGHAM: On what basis?

MS. OSBORN: Legal conclusion. It's the same

question we asked, where the water quality standard applies.

MR. PEARCE: Let me ask it this way.

Q Is it your understanding as a professional in this area that the water quality criteria applies in the receiving waters?

A Well, not being a lawyer, I'm not that adept at finding the legal authority that quickly. I believe that that authority is contained in WAC 040. I'm having a little trouble putting my fingers on it right away.

Q If I could clarify the question, I'm not asking for a legal opinion, I'm just asking what your understanding is as to how you apply these standards as a professional in the field, what your understanding of it is that they apply in the receiving waters?

A The first thing I would do as a professional in the field is go find out what the authority is, and I don't see it right here.

Q So your testimony is that you don't have an understanding of where it applies?

A I would have to look.

Q You would have to look to know where it applied?

A Yes.

Q But as you sit here, you don't have an understanding of it?

A Not being able to find it right now, it would be much simpler to go look than to spend time debating ascertainable facts.

Q Would you look at the zinc standard in 173-201A-040 in that table. That refers you to footnote (aa) and footnote (c), correct?

A Yes.

Q And footnote (c) is one-hour average concentration for the acute freshwater criteria?

A Yes.

Q Thanks. That's all we'll have for that exhibit.

Is it your understanding that metals criteria can also be adjusted on a site-specific basis?

A Yes, it is.

Q Is this a currently preferred approach by the EPA?

MS. OSBORN: Objection.

MS. COTTINGHAM: On what basis?

MS. OSBORN: There's no foundation here for Dr. Willing's knowledge about the EPA.

MS. COTTINGHAM: Would you lay a foundation.

Q (By Mr. Pearce) Are you aware of EPA's approach to site-specific standards?

A I believe that EPA's approach as distilled by the State of Washington is contained in footnote (dd), halfway down the paragraph it says: Metals criteria may be adjusted on a

site-specific basis when data are made available to the department clearly demonstrating the effective use of the water effects ratio approach established by EPA as generally guided by the procedures in USEPA Water Quality Standards Handbook December '83 as supplemented or replaced.

So that raises the whole subject of a water effects ratio study, or W-E-R-S, or several contractions that are used to designate it.

Q What I'm asking is if you're familiar with EPA's preferred approach?

MR. POULIN: Objection. There's no foundation as what EPA prefers or doesn't prefer.

MR. PEARCE: I'm asking if he knows, counsel.

MS. COTTINGHAM: I'll overrule the objection.

A EPA is a very large organization, and I don't know I would feel comfortable attributing a preference to an organization of that size and complexity. EPA has very detailed and extensive guidance on the application of water effects ratio studies and the procedure that is applied to develop a site-specific water quality standard. I'm somewhat familiar with that literature and conversely with the literature that has attempted to interpret that procedure for the State of Washington.

Q So it's my understanding then, you're not aware of EPA's

preference?

A As I say, I have difficulty ascribing a preference to a giant government bureaucracy.

Q That's fair. Do you know how a WER is developed?

A Do I know how a WER is developed.

Q Well, let's step back, let me withdraw the question.

Would you explain to the Board what a WER means, W-E-R, just what the letters stand for?

A Water effects ratio study.

Q That's a type of site-specific study, isn't it?

MR. POULIN: Your Honor, I object. This is outside of the scope of direct examination. There was no discussion of site-specific studies or WER or footnote (dd), for that matter.

MS. COTTINGHAM: Do you have a response?

MR. PEARCE: Yes. I can examine adverse witnesses on direct under the rules, but he does testify about WERs in his direct testimony, I believe.

MS. OSBORN: Was he on your list to call?

MR. PEARCE: No. We're cross-examining him, but I think we can cross-examine him about his testimony and I believe he does talk about site-specific standards and requirements for that in 401, in his direct testimony.

MS. COTTINGHAM: Let's stop the clock for a second.

Why don't you find where in his direct testimony you find that.

MS. OSBORN: Why are we stopping the clock?

MS. COTTINGHAM: I'm sorry, you're right. Start the clock back up.

(Pause in proceedings).

MR. PEARCE: We will come back to that.

I would note that Mr. Willing does talk about water quality standards in general, and this is a relaxation of -- or a type of water quality standard that can be set in the state of Washington, so I think it's fair to ask him about it on cross-examination.

MR. POULIN: We'll accept the acknowledgment that the WER is a relaxation of the standard.

MR. PEARCE: It's not an acknowledgment.

MR. POULIN: But Dr. Willing has not discussed the process.

Q (By Mr. Pearce) I think you did say in your testimony that there's a history of violations of the water quality standards by the Port, is that correct?

A Yes, that's correct.

Q And you rely on this 1997 report, Exhibit 426, is that right?

A That's correct.

Q Could you look at page 33.

A Yes.
Q That shows that this reports some data from 1995 to 1996, is that correct?
A Yes, that's correct.
Q Does this report hourly samples or instantaneous, hourly average samples or instantaneous samples, do you know?
A Without reviewing the report, I'm not sure I can answer that. I believe that there were automatic samplers that were used and I believe there were some grab samples incorporated in this report, but which sample was done by which method, I would not be able to answer that without looking at it carefully.
Q Unless it's an hourly sample or hourly average, you can't tell whether it's a violation of a water quality standard, can you, for zinc and copper?
A My understanding in conversation with Ecology practitioners is that a grab sample can be considered a one-hour average sample.
Q A single sample taken in one instant can be a one-hour average?
A If you have no other further statistical basis for it, if you haven't taken a good-faith effort to sample the average over the hour and you have a grab sample, then you use it for the one-hour average, yes.
Q So it's your testimony that an instantaneous sample can be

used as a one-hour average, is that correct?
A Yes.
Q Can you tell where these samples were taken?
A Again, without taking a close look at the report and its appendices, I wouldn't be able to tell you off the top of my head, no.
Q Okay. Would you take a look at page 21?
A Yes.
MS. OSBORN: Sorry, counsel, page 21?
MR. PEARCE: Yes, 21.
Q Could you read that paragraph about freeways, paragraph 4.2.1.3 on the record, please?
A Yes. This appears to pertain to the Miller Creek basin.
Q Does it indicate that two freeways pass through the watershed?
A Yes, it does.
Q And does it indicate the storm water for roads and these kind of traffic volumes typically contain high concentrations of TSS and metals?
A Yes.
Q And does it also indicate that portions of SR-519, at least, discharge above the Port's SDN 1 outfall?
A Yes, SR-518, I believe it is, yes.
Q Thank you for the correction.
Could you look back at page 35?

A Yes.
Q Look at the footnote (b). Does that indicate as to what outfall stations these samples were taken from on the Port property?
MR. POULIN: Objection. There's no clarity as to which samples we're talking about here.
A Yes.
MS. COTTINGHAM: Just a second.
MR. POULIN: Dr. Willing never referred to this table.
MR. PEARCE: Dr. Willing referred to this entire report and he claimed it showed water quality violations and I'm entitled to cross-examine him about anything in it, counsel.
MR. POULIN: Dr. Willing was talking about SDS 3, which is in the Des Moines Creek basin, and you are cross-examining him about outfalls in the Miller Creek basin which you have not yet specified.
MS. COTTINGHAM: I'll overrule the objection.
THE WITNESS: So that means you would like to hear my answer, is that correct?
MS. COTTINGHAM: Yes.
A (Continuing) Table 19, range of total recoverable undissolved metals concentrations for Miller Creek, which is a range, in other words, this composites a lot of data

and offers ranges for it, it doesn't offer individual analytical results that can be identified with an individual outfall location.

Q Does footnote (b) indicate the outfall stations?

A Yes, it does indicate the outfall locations that are associated with the numbers in the second column there of figures.

Q That's SDN 1, SDN 2, and SDN 3, is that correct?

A Yes.

Q We're in the same book. Would you take a look at Exhibit 425, the same graphic that Mr. Poulin asked you to look at?

MS. COTTINGHAM: Would you repeat the exhibit?

MR. PEARCE: It's Exhibit 425 and it's the last or next to the last page on that exhibit. Mine is a pull-out map. But it's 8 1/2 by 11 there?

MS. COTTINGHAM: Mm-hmm.

Q I hope you can read that, Dr. Willing, towards the top, can you identify where outfalls SDN 1, SDN 2, and SDN 3 are?

A Well, the outfalls are indicated by the black dots, yes.

Q Right. And can you see where Miller Creek is further over to the left?

A Not very effectively on this copy of the map, no.

Q Do you know if these outfalls are in pipe or what the

outfalls look like?

A I've seen that information, but I would not be able to recall it.

Q Do these outfalls route water to Lake Reba before discharging into Miller Creek?

A Again, I've seen that information, but I'm not able to recall it for specific outfalls.

Q Do you know whether the Lake Reba is a constructed storm-water quality facility or not?

A Yes.

Q And is it a stormwater quality facility?

A My understanding is it's a constructed stormwater facility, yes.

Q Going back to Exhibit 426, can you tell us if the reported metal concentrations in Exhibit 426 -- whether the hardness data is done for each sample or whether there's an average hardness used?

MR. POULIN: Objection, Your Honor. There are literally hundreds of samples discussed in this document.

MS. COTTINGHAM: Would you be more specific with what you're asking him?

Q (By Mr. Pearce) Do you know whether a general approach was taken in Exhibit 426 with respect to calculation of hardness?

A I believe that information would be contained in the

appendices to this document. If you have that appendix with you, I might be able to find the information you're looking for.

Q That's okay. I'm just asking if you know as you sit here?

A There was hardness data done as reflected in the appendix, yes, there are hardness values in there telling you which data sampling had a hardness value associated with it, but I would not be able to do it without looking at the data appendix.

Q Okay. Look at Table 19 again, page 35.

Do you know whether the calculated concentrations in this table used an assumed average hardness value or whether each particular sample had its own hardness value?

A Referring to footnote (d) in Table 19, it shows that acute criteria are calculated at 23 milligrams per liter calcium carbonate for Miller Creek, 35.6 milligrams per liter calcium carbonate for Des Moines Creek.

Q So it's --

MR. POULIN: Sorry, I would like to ask the witness to read the entire footnote there, please.

MR. PEARCE: Counsel can do that on redirect.

MS. COTTINGHAM: I'm going to overrule your objection.

Q (By Mr. Pearce) Does this indicate to you that an average hardness was used to calculate these?

A It looks as though a hardness value was assumed rather than measured for the purposes of the table, and, again, this table homogenizes a lot of information that came from the actual data sampling.

Q Did you depend on this table in forming your opinion about the history of violations of the water quality standards?

A I looked at this table, but my reliance was based more on the individual data analyses.

Q Where are those individual data analyses?

A Those are in the appendix I was referring to a minute ago.

Q Is that appendix attached here?

A It appears not to be, no. If you look at the cover page for this document, Exhibit 426, it says June 1997 Volume 1 report, and there was an accompanying Volume 2 appendix that was about that fat that had the individual analyses in it, and I don't believe we have that in front of us here.

Am I mistaken?

MR. POULIN: If I may, Your Honor. It's my understanding the Board has been provided one copy of the appendices much like the other multivolume exhibits. It was not used as an exhibit at this particular deposition and so it's not included within Exhibit 426, but it's within the exhibit list.

MS. COTTINGHAM: I think the question related to

whether he had reviewed the appendices, not whether we have it in front of us.

MR. POULIN: I'm sorry.

MR. PEARCE: Well, we can investigate that later, I'm not sure it's actually been put into evidence.

Q Let's take a look at the 2001 stormwater quality report - I believe counsel referred you to that earlier - that's Exhibit 6, if I recall.

I believe Mr. Poulin referred you to page 93. You can refer to that if you like. I just have a general question about the data reported in this 2001 report.

The samples here that are reported, are they hourly averages?

A I don't recollect how they were done. They were done for the purposes of NPDES permit compliance, for the most part, there are some exceptions to that but for the most part they were done as monthly or quarterly NPDES monitoring results.

Q Is hardness reported for any of those results?

A I don't remember.

MR. POULIN: I object to the form of the question, the term "those results," perhaps counsel could be a little more specific.

MR. PEARCE: I thought he knew the results he was talking about.

Q Is hardness reported for any of the NPDES sample data required reports?

A I can't remember the answer to that, exactly. One of my large concerns here is that hardness is not a required criterion under the NPDES permit monitoring provisions, so you don't have to test for hardness in order to comply with the NPDES permit. You can get a lot better idea of what's going on in the stream if you do test for hardness and you know what the water quality standard is that corresponds to the value you got for that particular sample, instead of assuming, as has been done very generally by the Port, some hardness value that came from someplace else at some other time, some other place.

Q Do you know whether the total dissolved fraction is the data we're talking about, is total dissolved fraction reported or total recoverable?

A The NPDES permit again is written in terms of total recoverable metals, and the water quality standards are written in terms of the dissolved fraction, so you have to make some sort of translation. You can either sample for both, run it through the filter that I was talking about and analyze both fractions independently, subtract it out and get the difference, or you can make some default assumptions, which are also specified in the water quality standards and discussed at some length in the Department

of Ecology's permit writers handbook.

Q Does that mean that the total dissolved fraction is not recorded here?

A I believe that's correct, yes.

Q And hardness is not reported here, is that correct?

A Without checking carefully what's behind these data, I would be a little reluctant to give you an answer for certainty, but I don't think it is.

Q Thank you. And these data are recorded at what's been termed outfalls, is that correct, these are gathered at the outfalls?

A Yes.

Q Okay. We saw those outfalls in Exhibit 425, is that right? Let's take a look at that again, let's go through it quickly, Exhibit 425, the chart with the black dots on it.

MS. COTTINGHAM: Page number by any chance?

MR. PEARCE: It's after the last page.

MS. COTTINGHAM: It's the map?

MR. PEARCE: It's the map, yes. Thank you.

MS. COTTINGHAM: Second to the last page.

MR. PEARCE: Second to the last page.

Q So you see the black dots on the top side of it, SDN 3, SDN 4, SDN 1?

A Yes.

Q SDN 2. There's a couple of outfalls to the right, the TY outfall and EY outfall there that says Gilliam Creek on the right-hand side of the page, do you see that?
A Yes.
Q On the bottom of the page, do you see where next to where it's labeled Des Moines Creek watershed, do you see SDS 7, SDS 6, and SDS 5 outfalls there all in a row?
A Yes.
Q And then further down to the southeast there, SDS 2 and SDS 3 outfalls?
A Yes.
Q And then the SDS 1 outfall by where it says south pump station?
A Yes.
Q And SDE 4 outfall by Bow Lake?
A Mm-hmm.
Q Can you see where the streams are, the dotted lines for the streams are on the map that you have?
A It's pretty sketchy on the map that I have there, this is a third generation xerox copy and they don't show very clearly.
Q Do you know how many outfalls go directly to a stream?
A Not off the stop of my head, no.
Q Thank you Dr. Willing.
You also talked about the 1999 stormwater report in

your testimony, at paragraph 22. Do you recall that?

A You are referring to my prefiled testimony?

Q Yes.

A Yes.

Q Do you know whether the data reported for metals concentrations in that stormwater report is the same as or uses the same method as the 2001 report we just went through? Well, let's me ask you specific questions.

Do you know whether hardness is reported similarly or hardness is not reported similarly to the 2001 report?

A I think it would be best if we looked at the actual report. Would it be possible to do that?

Q Well, I think we can just go to the 2001 report, and the 1999 report is what it is.

In the absence of hardness data, you can't tell whether there's a violation of water quality criteria, can you?

A Well, the Port has had the practice of making some broad assumptions about what hardness is, and then saying that, well, if the hardness were thus and such then the criterion would be thus and such. And I suppose you could make an argument that that demonstrates compliance, but I have a problem with it, being of an inquisitive mind, I prefer to see data that pertains to the question rather than general assumptions of what the data might be.

Q Could you look at page 9 of your prefiled testimony, paragraph 22?
A Yes.
Q About halfway down the paragraph, there's a sentence that says: In the absence of hardness data, it cannot be demonstrated that specific numeric water quality standards are or are not being exceeded. Is that still your testimony?
A Yes.
Q Look at page 35 of your testimony, if you would, please -- I apologize, it's paragraph 35, page 17. See about halfway down, there's a sentence that says: It's impossible for the reader to tell from the recent annual stormwater monitoring reports whether metal constituents of specific discharges comply with or violate water quality standards?
A Yes, I see that.
Q Is that your testimony?
A Yes, it is.
Q When you talk about recent annual stormwater monitoring reports, what are you referring to there?
A I'm referring to the last four, which I believe are the ones that I have reviewed and have had access to, which would have been 2001, 2000, '99 and '98.
Q So that includes the 1999 report that we briefly talked

about?

A Yes.

Q Do you know if any notice of violation has ever been issued to the Port of Seattle for violations of numeric criteria for metals?

A I have not seen any, no.

Q You talk about BMPs briefly in your testimony. Do you recall that?

A Yes.

Q Are sand filters an effective BMP for removing metals?

A That's a very general question, and the best I can do is give a very general answer. Well, let me be specific.

I have seen a sand filter that appears to be pretty effective at removing dissolved metals, particularly copper and zinc, on the basis of analytical results that have been taken from the influent and from the effluent from that facility.

Q How about constructed stormwater wetlands, are they also an effective BMP for removing metals from storm water?

A I have seen descriptions in the literature to the effect that they can be designed in such a way to effectively remove metals, and I use the term "remove" advisedly here, because what they're doing is really not removing but storing it for a period of time. In other words, if you look at the concentrations of metals that are reported in

the receiving water environment report, you see that SDS 3, for instance, generates a tenth to three-tenths of a pound of zinc for a typical storm. Where does that go? That goes into some receiving basin, in this case, the hypothetical would be a water treatment wetland, and it stays there for a while. It may not stay there indefinitely, it's got to go somewheres; zinc is a fairly conservative parameter, it doesn't just go away, it will wind up someplace. Copper is the same way. So it's going to be stored in a water treatment wetland, for instance, until something happens, some biological effect or some chemical effect happens that may mobilize it and send it on downstream to the water that was intended to be protected by the stormwater facility.

Q Well, a constructed stormwater will accept high levels of dissolved organic carbon, won't they?

A They may or may not, it would depend upon the details of the construction.

Q Are leaf compost filters also an effective BMP for removing those?

A I have reviewed some of the literature, and again I call it literature advisedly because I've seen very little in the peer-reviewed scientific literature to the effect that leaf component filters are effective, I think there's a real question about how you measure and document

effectiveness of a stormwater treatment facility, and in fact the Department of Ecology is working on a protocol at this time for answering that exact question.

Q Can I refer you -- I'm sorry, were you done answering my question? I'm sorry to interrupt you.

A I wanted to come back to the point that if I could use the phrase the "jury is still out" on how well these leaf-compost filters work. They haven't been proven up with the input concentrations that are typical of storm water for instance at SeaTac airport.

Q Would you look at page 12 of your testimony. And from the middle of the page there, best management practices, you state there: Best management practices that are known to be effective in removing metals are shown in the resource stream protection menu of the manual, pages 6 through 10. They include sand filters, stormwater wetlands, two facility treatment drains, and leaf compost filters. Is that still your testimony?

A Yes. The manual I'm referring to is the King County manual in this case.

Q Thank you. You were at the site visit at the airport, I believe you said, on the 28th of February, is that right?

A I believe that was the date, yes.

Q Did you take water quality samples?

A I collected some of the water quality samples, yes.

Q Who determined what samples to take?
A There was a discussion in which I took part that resulted in a determination of which samples to take.
Q Who determined which samples?
A There was a consensus decision.
Q Who determined where to take the samples?
A That was also a consensus decision.
Q And was it also a consensus decision about what analysis to have done?
A I think there was pretty general interest in turbidity and copper.
Q Are you familiar with EPA method 1669, test procedure for trace metals determinants?
A Yes, I am.
Q Was this procedure used to collect those samples?
A No, it was not.
Q What sampling procedure was used?
A We used a sampling procedure -- okay, the numbers don't mean anything. EPA method 1669 is a quite elaborate methodology for collecting and analyzing a sample to make sure that there's no contamination of the sample and that you're really measuring what's in the sample rather than measuring some inadvertent contaminant, and it's a very elaborate and fairly expensive method, it requires two people and it requires a clean hands versus dirty hands

approach: One person is a clean hands person, they don't touch anything, they have gloves on that are lubricated with something else besides talcum, because talcum powder can have metals in it. The bottles are contained in a plastic bag and that plastic bag is contained in another plastic bag, and there's quite elaborate efforts to make sure that nothing contaminates the actual sample which is inside the bottle. And then there's a whole suite of other precautions one has to resort to, to make sure the sample is not contaminated by anything other than the target water you're trying to analyze.

Obviously, with 24-hours notice about the availability of the site visit on Port property, it was not possible to organize anything approaching what I would consider a sampling routine that would be sound from the point of view of data collection and sound from the point of view of quality assurance and quality control methods. We had to content ourselves with one or two grab samples, which obviously don't have the value that samples taken under a systematic sampling routine would have, you know, the kind of systematic sampling routine that the Port presumably would use for its routine NPDES sampling and sampling for other purposes.

Q Thank you. Did you use acid-washed bottles, for example?

A Typically in taking water quality samples you tell the

laboratory that's going to do the analyses which analyses you would like to do, and they a provide the appropriate bottles that are sealed and labeled and have a chain of custody form, and if the sample requires an acid-washed bottle then they know that and they provide you with an acid-washed bottle. So that's what we did with the certified laboratory.

MS. COTTINGHAM: Mr. Pearce, can I ask how many questions do you have more, approximately?

MR. PEARCE: Another five or ten minutes. Shall I go ahead and finish?

MS. COTTINGHAM: Yes.

Q (By Mr. Pearce) Okay. Let's move on.

Could you look back at the outfall TR copper de-icing report, which is this illustrative that was presented today. Just so I'm clear, the first page of this represents total recoverable amounts, correct, not total dissolved?

A Total dissolved I don't think would be a term of art.

Q But it says "outfall TR" on the top, so my understanding is that means total recoverable, is that correct?

A That's correct.

Q If you look at the second page, the list of outfalls in the second column, that's where these data were collected, is that correct?

A That's my recollection, yes.
Q So these were all at the outfalls that we saw on the map on Exhibit 425?
A Yes.
Q They weren't in any of the streams, to your understanding?
A The de-icing study indicates these were outfall values rather than receiving water values.
Q And, again, you have on the last four columns, TR, CU meaning copper, is that correct?
A Yes, Cu is an abbreviation for cupric, which is the Latin name for copper.
Q So these were all total recoverable values, correct?
A That's correct.
Q And assumed hardness value?
A Well, I assumed the hardness values that are shown in the last three columns there, and you can see the effect of my assumptions in the graphical portrayal of these data which is the first sheet I've offered here. I realize it does not include the hardness of 100 line.
Q And are these hourly-averaged data or are they instantaneous readings, or do you know?
A I believe these -- I wouldn't be able to answer your question without looking back at the underlying study, which I believe is Exhibit 1128, which I don't have here in front of me.

Q That's okay. We'll skip that in the interest of time.
You submitted some testimony about the low-flow analysis, did you not?
A Could you be more precise and tell me where in my testimony you're referring?
Q I think it's 10 through -- something like 8 through something like 20.
A Yes, I did.
Q Have you reviewed the December 2001 low-flow analysis?
A Yes, I have.
Q Do you know what the HSPF model is?
A Yes, I do.
Q Have you ever performed a calibration of an HSPF model?
A I have never performed a calibration of the HSPF model, myself; I have sat at the elbow of a number of people who have performed HSPF calibrations, in fact I sat on a graduate special committee of a gentleman who received a masters degree at the Huxley College of Environmental Studies in Bellingham. He did his masters thesis on an implementation of the HSPF model in the Lake Whatcom watershed. I've also worked at some length with Dr. Norman Crawford, who is the original author of the HSPF model and wrote his dissertation at Stanford University on basically the HSPF model which was then called the Stanford Watershed Model, and he is the one who

authored that.

Q Do you consider Dr. Crawford an expert in HSPF models?

A I'm very cautious about of my use of the term "expert," but I would say if it applies to anybody it applies to Dr. Norman Crawford.

Q In paragraph 19 on page 8, you state that low flows that are biologically stressful might be missed. Is that correct?

MS. OSBORN: I'm sorry, could you indicate where?

MR. PEARCE: The last sentence of that paragraph, paragraph 19. Did I misspeak? On page 8.

MS. OSBORN: Got it. Thank you.

Q (By Mr. Pearce) Is that correct, Dr. Willing?

A Yes. I see paragraph 19 and I see the last line of it, yes.

Q Are you a fish biologist?

A No, I do not call myself a fish biologist. Again, I attended a university where there were 25 or 30 graduate students in fish biology who were my constant companions for a period of four years, and let's say there was a process of intellectual osmosis that was going on there.

Q Are you yourself a professionally trained biologist of any kind?

A Yes, I have professional training in biology.

Q Do you have a degree, a graduate degree in biology?
A I have a masters degree and a doctorate degree both from the Department of Natural Resources at Cornell University, and a great part of my masters training there was under the tutelage of Dr. Gene Lykens, who is one of the preeminent lake biology authorities in the United States.
Q Have you made any quantitative assessment of the aquatic biota in affected streams around the airport?
A No, I have not.
Q Have you done any sort of quantitative study that would tend to show any particular level of flow in Miller, Walker, or Des Moines Creek that would be biologically stressful?
A No. That's an interesting point that you raise, because that's one of the concerns that I have and I haven't seen such a study either. I tend to look for what's called an instream flow incremental methodology. When somebody starts to talk about whether a particular stream in a particular place is good for a particular organism, that is the tool. IFIM is the model that was developed by the U.S. Fish and Wildlife Service. And I've actually attended U.S. Fish and Wildlife training at Fort Collins, Colorado, where they teach you how to apply that model, and I've had extensive experience with that model in my work at Seattle City Light, where I was responsible for

the environmental effects of a lot of hydroelectric projects on salmon bearing streams. So I do have some experience with that IFIM model applied to salmonids and also applied to other species as well. One of the concerns that I have is I haven't seen an IFIM for any of the streams in the SeaTac area.

Q Would you look at paragraph 53 at page 28 of your testimony?

A Yes.

Q You talk about a WER there, don't you?

A Yes.

Q Once developed, would the WER metals criteria become the applicable criteria for that particular stream?

A I'm sorry, I didn't quite catch your question.

Q If a WER is developed for a particular stream or site, then once it's developed it becomes the applicable water quality criteria for that particular stream or site, does it not?

MR. POULIN: I object, Your Honor. We're back to the WER study and it's also a question of law.

MR. PEARCE: I just pointed out where he testified about it, counsel.

MS. COTTINGHAM: That's why I asked earlier where his direct testimony referred to WERs.

MR. PEARCE: I'm not asking for a legal opinion,

I'm asking for his understanding.

MS. COTTINGHAM: So I'll overrule the objection.

Q (By Mr. Pearce) Is that your understanding?

MS. COTTINGHAM: Can you repeat the question?

MR. PEARCE: Yes.

Q Once developed for a site or stream, is it your understanding that if a WER metal criteria is developed that then becomes the applicable water quality criteria for that particular site or stream?

A Well, my answer would be not so fast. There's quite an elaborate process attendant upon the development of the study for how you conduct --

MR. PEARCE: Your Honor, Dr. Willing keeps giving long speeches, and in the interest of time, it's a fairly simple question, I just want to know whether it becomes the applicable criteria or not.

MR. POULIN: I would have to object to any suggestion that the WERS process is simple in any respect, and if this expert thinks that it requires --

MR. PEARCE: I didn't ask whether it's simple, I just asked him whether --

MS. COTTINGHAM: Hang on. You asked a simple question. Provide a simple answer and on redirect examination he will be able to elicit further information.

THE WITNESS: Okay.

A (Continuing) My understanding of the WERS process is you come up with a study design and then you do the study and you go through a public process to decide what to do with the results of the study. And then quite sometime later, after quite a lot of effort, you decide whether a water quality standard for a particular parameter for a particular location should be amended.

MR. PEARCE: Thank you, Dr. Willing. That's all I have.

MS. COTTINGHAM: With that, why don't we take a 12-minute break and come back at 11:30 and we'll move to Mr. Young.

(Recess).

MS. COTTINGHAM: Back on the record.

For all of the rest of you, I have asked one of our AAJs to meet with the folks on the potential motion that will be happening after lunch, just so we can get an advanced look.

So with that, Mr. Willing, you're still under oath. And I assume that, Mr. Young, you want to do some cross-examination.

MR. YOUNG: Yes, I will ask a few questions.

EXAMINATION

BY MR. YOUNG:

Q Dr. Willing, I wanted to ask you about your testimony that you filed, the prefiled testimony. Do you have that in front of you?

A Yes, I do.

Q Do you have also the exhibits that are attached to it?

A No, I don't believe I have them all, no, I don't.

Q You do not have the exhibits?

A That's correct.

MR YOUNG: Can we get you a copy? Do you have one, Ms. Osborn?

MS. OSBORN: I do, although this is my copy of it.

(Pause in proceedings).

Q (By Mr. Young) Do you have now a copy in front of you with your exhibits?

A Yes.

Q I want to look especially at Exhibit E.

A Yes.

Q This is an article, is it not, it looks like an article from some sort of journal or something, is that correct?

A Yes, it is.

Q This is something that you make reference to in your testimony, is it not?

A Yes, I believe I did reference it.
Q Can you read the first sentence, please, of the abstract on the first page? Aloud, please.
A Yes. The control and treatment of highway pavement storm water at the edge of the highway shoulder pose unique challenges due to the unsteady nature of processes, including rainfall runoff, mobilization and partitioning of heavy metals, variations in stormwater chemistry, residence time on the pavement and delivery of particulate mass.
Q Do you agree with that statement?
A Yes, I do.
Q I assumed that you did since you've attached it to your testimony, but I just wanted to ask.

MR. POULIN: Objection. Counsel is testifying.

Q (By Mr. Young) I also want to look a little further down on that page, and in the second full paragraph again of the abstract, there's a sentence that begins with the word "while no" -- do you see that?
A Yes.
Q Can you read that sentence out loud, please?
A While no simple solutions exist for the removal of a heavy metal or particle once released into the highway environment, knowledge of the dynamic processes in highway runoff can provide insights for the proper selection of

BMPs depending on conditions at the highway site.

Q Do you agree or disagree with that statement?

A That seems a valid statement to me.

Q Now this is talking about highways, but would you think that the same statement would apply to airport runways?

A There are many parts of this article they're talking about the dynamics of storm water and what goes on in storm water that I think are analogous to what would happen on an airport runway.

Q How about that particular sentence that you've just read, do you think that applies to an airport runway, as well as a highway?

A Well, it's written specifically to highways, but I think one can make mental parallels to apply it to an airport environment, yes.

Q So then you would agree that no simple solutions exist for the removal of a heavy metal or particle, once released in the airport environment?

A Well, let's say that the complexity I believe would go considerably beyond the deployment of a filter strip.

Q Okay. And that knowledge of the dynamic processes in an airport runoff can provide insights for the proper selection of BMPs depending on conditions at the site.

I take it you would agree with that?

A Yes.

Q Isn't the Department of Ecology through the water effects ratio seeking to gain knowledge of the dynamic processes of the airport runoff to provide insights for the proper selection of BMPs?

A I have read testimony and heard from the Department of Ecology that they don't know what's going on at SeaTac airport as it is, so it mystifies me why we would be worried about changing the water quality standard. If we don't know whether we're in compliance or not with the standard as it exists now, then let's apply this analytical process that you're suggesting, knowledge of the dynamic processes, let's apply that to the existing situation.

Q I'm just asking, isn't the Department of Ecology and the Port, through the water effects ratio study, seeking to gain knowledge of the dynamic processes of the airport runoff to provide insights for the proper selection of BMPs?

MR. POULIN: Objection, asked and answered.

MR. YOUNG: I don't think he really answered.

MS. COTTINGHAM: Can you read back the question so I can hear that?

MR. POULIN: Your Honor, I would further object that --

MS. COTTINGHAM: Let me hear it first.

(Reporter read from the record).

MR. POULIN: The question asked the witness to speculate as to the intent of the Department and the Port.

MR. YOUNG: I'll ask a different question.

Q Let's go to the next the page, page two of the same article. In this section it is labeled "introduction," and the second sentence of that section starts with the word "compared to," do you see that?

A Yes.

Q And can you read that sentence out loud, please.

A Compared to drinking water and domestic wastewater, stormwater treatment continues to pose uniquely difficult challenges due to the unsteady and stochastic nature of the processes including traffic, rainfall runoff, heavy metal partitioning and transport of entrained solids.

Q Do you agree or disagree with that statement?

A Well, I think the statement is part of a pretty long article, and it's in the introduction so it's summary in nature and it relates to a whole lot of specific observations that come along later on. It's hard to pick the sentence out of its context and have it mean as much as it does in context of the whole article.

Q Well, I guess what I'm asking is, do you agree with the statement here that compared to drinking water and domestic wastewater, stormwater treatment continues to

pose uniquely difficult challenges due to the unsteady and stochastic nature of processes, including et cetera, et cetera?

MR. POULIN: Objection. Asked and answered.

MS. COTTINGHAM: I'm not sure it has been answered, so I'll overrule.

A Well, any wastewater flow, whether it's a domestic wastewater or industrial wastewater or storm water is going to be characterized by unsteady and stochastic flow, that's the nature of the beast. I have had very recent discussions with the people who operate the wastewater treatment plant, the municipal wastewater treatment plant for the City of Bellingham, and they have lots of war stories about dealing with sudden slugs of this or that or the other thing that come down the pipe, and what they do is when the hydraulic capacity of their system is exceeded, and they could relate to this sentence very readily, they would say: Yes, storm water is not unique in that respect when you have those same problems. So picked out in isolation, this sentence I think maybe could be broadened a little bit.

MS. COTTINGHAM: For the Board's understanding, could you define the word stochastic?

THE WITNESS: Yes. Behaving according to a probability distribution.

MR. JENSEN: Would you define what you just said?

(Laughter).

THE WITNESS: Randomly distributed, would that help?

MR. JENSEN: Thank you.

THE WITNESS: In other words, you can't tell what's coming down the pipe next or how big it's going to be or how long it's going to last, there's no basis for even -- there's bounded variability, you know that you're not doing to get a hundred million gallons per day in the Bellingham sewer treatment system, but you know you might get anywhere between five and 50, so the process is dealing with bounded variability. We know that we won't get -- we know that half an inch of rainfall at SeaTac airport in a 24-hour period is possible, three inches in a 24-hour period is probably not possible.

MS. COTTINGHAM: You may continue.

Q (By Mr. Young) You have some experience, as I understand it, in drinking water, is that correct?

A That is correct.

Q I want you to look at the Figure 5 in this article. Figure 5 is at the back, if you go past the text, there's some graphs. Go to Figure 5.

Are you there?

A Yes.
Q And this shows the temporal variations of the dissolved fraction with respect to lead, copper, something and zinc, isn't that right?
A The Cd I believe is the one you're having trouble with and that would be cadmium.
Q All right. It appears from these graphs that the variations of dissolved fractions of these metals is quite extreme. Would you agree?
A The fd, which is the Y axis of these graphs, is a nondimensional -- it's a dimensionless parameter, and without taking what would probably turn out to be an inordinate amount of time for me to go back and refresh my memory, it might be difficult to explain to the Board exactly what fd is, so it's hard to say whether a change between point five and 1.0 fd would be significant. So I'm not sure exactly what you're trying to get at here.
Q Now the water quality standard applies to the dissolved fraction of the metal, is that correct?
A That's correct, as I understand it.
Q And it would seem from these graphs that that dissolved fraction varies with time, is that fair to say?
A Yes, it does vary with time.
Q In fact, it varies within a relatively short period of time, doesn't it, because the elapsed time is 20 minutes,

30 minutes, even within an hour it varies, does it not?
A This is what the data from this piece of research showed, yes.
Q So if we took a sample at one point, say minute number ten, we wouldn't know whether that represented dissolved fraction over the course of an hour, would we?
A That would not necessarily be a valid basis for extrapolating what the value would be at other times during the hour, no.

MR. YOUNG: Thank you. That's all of the questions I have.

MS. COTTINGHAM: Any redirect?

MS. OSBORN: Yes. I have a couple of questions.

EXAMINATION

MS. OSBORN:

Q Dr. Willing, what is the basis for your statement that water quality standards are violated by the Port's storm water?
A The basis starts out with the receiving water environment report.
Q Is that Exhibit 426?
A I believe it is.
Q Do you have that there?
A Yes.

Q And could you please go ahead and find it.

Is hardness data reported in this report?

A Yes. Hardness data was reported and associated with a large number of the analyses that are reported in the report part of this document. The actual data are contained, as we said before, in the technical data appendix.

Q And so is this the basis for your determination that water quality standards are being violated?

A Yes. If a sample is taken in a stream upstream of a discharge, another sample is taken downstream of a discharge, and a third sample is taken in the discharge itself, and all three of them are in excess of the water quality standard, then it's pretty clear that the discharge, the constituents in the discharge are violating the water quality standard. And that is the situation that's reported in this receiving water environment report.

MS. OSBORN: Ms. Cottingham, I did not ask the question on direct. Dr. Willing asked me to ask him about a correction he would like to make to his testimony, and I forgot about it, and with permission I would like to ask him about that now.

MS. COTTINGHAM: Is that a correction to his verbal or his prefiled?

MS. OSBORN: The prefiled, yes.

MS. COTTINGHAM: I'll allow the question unless there's any objection.

MR. PEARCE: No objection.

Q (By Ms. Osborn) Dr. Willing, you indicated to me that there's an error in your statement at paragraph 41 that you would like to correct. Would you please tell us what that correction is?

A Yes. This is a mistake that I didn't catch in the preparation of my prefiled testimony. The middle of the page says that hardness renders metal ions in water less toxic by providing positively charged exchange sites for the metals to attach themselves.

MS. COTTINGHAM: Where are you again?

A In the middle of the page, page 21, paragraph 41.

Q The statement starts "Hardness renders metal ions"?

A Yes. And the correction should be, instead of saying "providing positively," it should say "excluding negatively charged sites". What I did was get the two ends of two magnets lined up so the plus ends are facing each other and that can't work.

MS. OSBORN: Thank you. We have no further questions.

MS. COTTINGHAM: Mr. Poulin, I understand you have a question.

MR. POULIN: Yes, Your Honor.

EXAMINATION

BY MR. POULIN:

Q Dr. Willing, we've discussed on direct and on cross the 1997 Stormwater Receiving Environment Monitoring Report?

A Yes.

Q You have reviewed not only the summary report but also the technical appendices?

A Yes, I have. It's very extensive and I can't claim to be completely conversant with it, but I spent a lot of time reading it, yes.

Q Do you recall whether the technical appendices report hardness for individual samples?

A My recollection is that they do, yes.

Q Is it also your understanding of the stormwater receiving environment report that it was undertaken as a requirement of the Port's NPDES permit?

A That's my recollection, yes.

Q And I believe you stated that it involved sampling not only the discharge but also the receiving water upstream and downstream?

A Yes, it was intended to ascertain the effects of the discharges on the receiving waters.

Q And my final clarification, if we could briefly refer back

to the map in Exhibit 424, if I'm not mistaken.

MS. COTTINGHAM: 425.

MR. POULIN: 425, thank you.

Q Do you recall that Mr. Pearce asked you about the outfalls at SDN 1, SDN 2, SDN 3, and SDN 4. They discharge to Miller Creek through Lake Reba, is that right?

A Yes.

Q And they're on the top of this map?

A Right.

Q But SDN 3 is down here at the bottom, isn't it?

A Yes, it is.

Q That doesn't have anything to do with Lake Reba, does it?

A No, that's to the north. Lake Reba is part of the Miller Creek basin and SDS 3 is a tributary of the Des Moines Creek basin.

Q Isn't it true that SDS 3 is on the west side of a divide that flows into the west branch of Des Moines Creek?

A Yes.

Q That's removed from non-Port influences over here on the east branch, isn't that right?

A My understanding is that SDS 3 is very -- not exclusively but has a very small proportion of its watershed area that is not controlled by the Port of Seattle.

MR. POULIN: No further questions.

MS. COTTINGHAM: Board questions.

MR. JENSEN: Yes.

Dr. Willing, you were asked a question on cross-examination about -- I forget what it was about, but you referred in your response to instream flow method -- what is that again, IFIM?

THE WITNESS: Yes. IFIM is instream flow incremental methodology, and it's a pretty standardized model developed by the United States Fish and Wildlife Service for ascertaining the suitability of the habitat of a stream for individual species, and it's even broken down more specifically than that, it's individual life stages of the individual species.

MR. JENSEN: I think you indicated your surprise that one had not been done for these creeks, or you didn't see one referenced in the various documents you had?

THE WITNESS: That's correct, yes.

MR. JENSEN: Why were you surprised?

THE WITNESS: Well, in previous discussions that I've encountered where there was a question about what is the effect of action X going to be on stream Y, then the tool for dealing with that in my experience has been to do an IFIM model to take a look and see what's going on. I've encountered this in a number of other situations where those have been done.

MR. JENSEN: Have you seen any indication or

received any information as to why one was not done here?

THE WITNESS: I have no information as to why it was not done.

MR. JENSEN: That's all I have.

MS. COTTINGHAM: Mr. Lynch, do you have questions?

MR. LYNCH: I have a couple of questions.

Thank you for your testimony today.

You were asked a question about the effectiveness of water treatment wetlands, on cross-examination, in removing metals from the waters, and you said that it stored the metals but they could easily be mobilized at some later point. And I wanted to understand that a little bit better. Would they be mobilized just by a regular rainfall or would it take a major storm event? I'm trying to get a sense of how easily these metals would be, I guess, flushed from the water treatment wetland.

THE WITNESS: Mobilization of metals that were bound in a particulate form, for instance, the form could be changed by a couple of different things happening. One is that the pH might change, the pH would go down. The pH is the hydrogen ion concentration in the water or the acidity of the water, in other words, if the water becomes more acid, then the bound forms of the metal tend to become more mobilized and go back into the dissolved

state.

Another thing that can happen is that the dissolved oxygen can drop, and this can happen as a result of biological activity or chemical activity. It can be either biological or chemical things going on that would consume available oxygen and the dissolved oxygen would drop, and that also would have the effect of changing the form of the metals so they would to go back into the dissolved state or into the biologically available state.

The third thing that can happen, particularly in the saltwater environment, the nearshore receiving waters, if you will, what flows downstream from Des Moines Creek is eventually going into the bay out there, so in the nearshore marine environment you can have other chemical species that will, if the metal is bound to some particle, you know, one of the organic colonies we're talking about, then there are things in the marine environment, particularly chlorine, which is readily available, that competitively seek those binding sites and can turn the metal into a dissolved state. I refer to this in my testimony. So there's several things that can go on there that can change the form or change the dynamics of the metal in the place where it's being stored temporarily.

MR. LYNCH: I have another question regarding page six of your prefiled testimony, paragraph 15. In the

second sentence of paragraph 15, you refer to a particular concern as the lack of demonstration that a storage vault can maintain water quality over a six- months storage. I was interested a little bit about the water quality in one of these storage vaults over a period of time. Is it that the temperature goes up or the oxygenation in the water is changed? And then I also would be interested in your thoughts about the fact that this water is sitting in the storage vault; do any of these metals precipitate out or cause the pH of the water to change? Or just educate me a little bit more about the water in the storage vault.

THE WITNESS: Okay. The Port itself in some of its own documents has acknowledged that dissolved oxygen in these vaults is going to be used for augmenting stream flow is a concern, and their designs have shown an increasing acknowledgment of that problem in the successive iterations of the low-flow augmentation studies and accompanying plans to do something about that, so they know that there's a dissolved oxygen situation that they have to take account of.

Their response has been: Well, we will allow the King County standard for ventilated surface, in other words, grates, to get free air movement across the surface of the water, and if that doesn't work we'll increase the dissolved oxygen by using bubbler systems or some other

technique to make sure that the dissolved oxygen doesn't drop. So I think that can be done and the Port has certainly shown an increasing acknowledgment of the fact that has to be done.

The overall dynamics of what's going on in the storm water depends on what's in it in the first place, and what's going to take place in the storage vault itself is second, and, third, how do you get it out of there, you know, are you going to get it out of there in such a way it doesn't stir up the sediments and remobilize things? So all of those details have to be attended to satisfactorily in order to make the stormwater storage concept work and make it capable of producing water that can be used for augmentation in the low flow of a Class AA stream.

MR. LYNCH: Will some of these metals that are in the water precipitate out if they're in a storage vault?

THE WITNESS: It's hard to say. Some of them probably would, if there are available things for them to bind onto, then they would; if there aren't things available for them to bind onto, organic carbon, for instance, or finely divided sediment, as Dr. Sansalone reports in his paper that I have attached here, then they could just remain in the dissolved state there. So the

monitoring program that companies the low-flow study has kind of a retrospective character about it in the sense that you look and see your problems develop rather than, you know, dealing with it ahead of time.

MR. LYNCH: Thank you.

MS. COTTINGHAM: I have two questions.

I want you to explain the difference between two things. One is the table on Table 19 in Exhibit 426 that you used, and I believe it's on page 35.

The column on the far right-hand side that says "criteria standards," do you see that there on the far right-hand side?

THE WITNESS: Yes.

MS. COTTINGHAM: How did those numbers -- well, let's use copper, for example. How do those numbers there compare with something on the bottom of one of the illustrative exhibits where at the bottom it says acute water quality criterion 10.3 equals point 0103. I'm trying to figure out why the numbers aren't the same. Can you explain why they're different?

THE WITNESS: I'm not following your comparison. I see the 4.2 on Table 19.

MS. COTTINGHAM: Yes. Then this illustrative exhibit that was part of your testimony has point 0103. Can you explain the differences? They may be just in my

understanding of the calculations rather than any difference in standards.

THE WITNESS: Well, the 4.2 micrograms per liter, which is the terms that Table 19 is reported in, would correspond to an acute water quality criterion of 10.3 micrograms per liter on the illustrative exhibit.

MS. COTTINGHAM: Explain to me how they relate to each other, is calculation a factor?

THE WITNESS: Yes. They relate through the hardness values. If you noticed on the illustrative exhibit -- and this is the effect that changing hardness has on the criterion. You see on the illustrative exhibit, the line below that has 56 milligrams per liter of hardness?

MS. COTTINGHAM: Yes.

THE WITNESS: Okay. The effect of lowering the hardness value to the 23 milligrams per liter assumed on Table 19 -- you see footnote (d) there?

MS. COTTINGHAM: Mm-hmm.

THE WITNESS: The effect of lowering that number from 56 to 23, cutting it in half, more or less, has the effect of lowering the water quality criterion for copper from 10.3 micrograms to 4.2 micrograms.

MS. COTTINGHAM: Thank you. I just wanted you to walk through that for me.

THE WITNESS: Okay.

MS. COTTINGHAM: The next question I have for you -- I didn't quite catch it. You were testifying about the filter strips. You said the storm water won't be effectively treated by filter strips, and then you said that the earlier 401 had a more elaborate treatment scenario. Can you explain the differences between, from your understanding, of the August -- I assume when you said earlier you meant August versus the September 401. What happened, what changed that changed your analysis?

THE WITNESS: I think I didn't make my reference clear. The version of the 401 water quality certification that had the elaborate list of best management practices, essentially has conditions in the 401, was the 1998 version. It was not the earlier 2001 version.

MS. COTTINGHAM: Great. You don't have to go further then, it was not the difference between September and August, it was an earlier -- was that a draft?

THE WITNESS: I believe. I'm not sure of my legal facts here what exactly happened, but the 1998 water quality certification was issued, granted, and then I don't know what happened, but it was withdrawn and we wound up with --

MS. COTTINGHAM: We'll leave that testimony for somebody else, I'm sure, but I just wanted to clarify what

your point of reference was.

I have no further questions.

Mr. Jensen.

MR. JENSEN: I have one question I was wondering about. Is there a difference between a filter strip and a sand filter strip?

THE WITNESS: Yes, there's a big difference.

MR. JENSEN: What is that difference?

THE WITNESS: A filter strip, basically all you have to do is grade the surface of the ground and scatter grass seed and you're pretty much in business. A sand filter is an elaborately constructed designed facility which has a quite tight specification on what the sand filter media are and what the underground system is and the loading rate and the velocity going through the sand filter. You know, it's a pretty sophisticated installation. And I believe the Ecology refers to some chemical amendments that can be used; well, the most recent Ecology stormwater manual refers to specific amendments that can be made to sand filters to make them behave better as metals removal facilities. So a sand filter is a constructed facility filter strip, has pretty much a hap-hazard grading of the surface and seeding it with some sort of vegetation, usually grass.

MR. JENSEN: Thank you.

MS. COTTINGHAM: Are there questions as a result of the Board questions?

MS. OSBORN: Just one.

EXAMINATION

BY MS. OSBORN:

Q In response to Mr. Lynch's question regarding water quality in the stormwater reservoirs that are to be used for low-flow augmentation, you're familiar with the December 2001 low-flow plan, is that right?

A Yes.

Q Does it resolve the issues concerning or deal in any detail with the issues concerning water quality in those flows?

A Not to my satisfaction, no.

EXAMINATION

BY MR. POULIN:

Q With respect to the water quality in long-term storage vaults, are you aware of growing understanding of pH problems associated with new concrete vaults?

MR. YOUNG: I object on lack of foundation.

MS. COTTINGHAM: Lay a foundation.

Q (By Mr. Poulin) Is there a concern about pH with new concrete vaults?

A My understanding of the Port's intention is to construct the storage vaults out of poured concrete, and poured concrete is known to have some quite startling effects on pH of water that's stored in it.

Q And that pH is one of the factors you've identified that can remobilize stored metal?

A Yes.

MR. POULIN: Thank you.

MS. COTTINGHAM: Mr. Pearce, any questions result of Board questions?

MR. PEARCE: Very briefly.

EXAMINATION

BY MR. PEARCE:

Q I believe you testified in your deposition about practices to aerate water that's been stored for some time. Do you remember that?

A Yes.

Q Bubblers are very common?

A Relatively, yes.

Q And running water across a - pardon my lack of technical understanding - a wash board or a crinkled surface is also a method that can be used?

A Turbulent flow exposed to available oxygen is a good way to aerate a stream of water, yes.

Q How about BMPs for the insides of stormwater vaults where they may contact water, you can just paint them, can't you, paint them or seal them?

A I assume it would be possible to seal, yes, in fact I have experience in the drinking water business of concrete vaults that can be sealed against effects from the vault itself.

MR. PEARCE: Thank you. That's all I have. Thanks very much.

MS. COTTINGHAM: Mr. Young.

MR. YOUNG: Nothing.

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

And with that I think we'll break for lunch. Is it the interest of the Board members and the parties to take a one-hour lunch or do you need a little more time?

How about if we come back at 1:30.

With that we'll go off the record.

(Noon Recess).

(The following proceedings were had in the absence of Board Members Bob Jensen and Bill Lynch)

MS. COTTINGHAM: We'll go back on the record.

I'm going to deal with the motion or whatever the issue is that's going to come before us.

Mr. Eglick.

MR. EGLICK: Shall I proceed?

MS. COTTINGHAM: Yes.

MR. EGLICK: Thank you.

We have asked that the Board exclude from the prefiled testimony of Charles Ellingson, paragraph 18 and Exhibits C and D, and then also from the prefiled testimony of Joseph Brascher, paragraph 13 and paragraphs 37 and 38. We also ask that the Board exclude any live testimony, of course, that would attempt to convey related or similar information and exclude anything else that as it appears now there may be some thought that is going to be offered. Let me explain.

I know the Board is well aware of the background in terms of the prehearing order, but just if one looks at the original October 30th prehearing order on page four, there's a couple of key sentences under the section that's titled on page four of that October 30 order, roman numeral four preliminary exhibit, that I think we want to bear in mind for the discussion here. And I'm referring to the lines beginning at approximately line 12 that say: On or before November 15th, Respondents Ecology and the Port will identify all plans and reports prepared or expected to be prepared pursuant to the 401 certification.

Now if one looks at the 401 certification, one of the key plans or reports that was called out as needing to be prepared, and we've said before of course that we think

there was quite a list of work that needed to be done for that was in condition I on page 22 of the September 401, which I believe is Exhibit 1.

MS. COTTINGHAM: What page?

MR. EGLICK: Page 22 of the September 401, and it's condition I. And as we've discussed a number of times at the stay proceeding and in various other contexts, there are four pages of descriptions of what needs to be done, all with the end of submitting to Ecology an acceptable low-flow plan. And if you look at condition I, the first paragraph in it refers to a revised plan integrating the low streamflow analysis and summer low-flow impact effect facility proposal into a single document that addresses the following issues. And then the list of issues goes on for four pages.

So that's the lone star for our concern here. I don't want to neglect the fact that we also have a discovery concern, but I do want to focus on the prehearing order for a moment. Because the prehearing order says, well, if you've listed these plans and reports then here is what you have to do: For those plans and reports expected to be completed between November 16, 2001 and February 2002, respondents shall identify the estimated completion dates. So when are you going to have it done? You have to let folks know, and I don't think we

ever really got that in the way we would have hoped, but fair enough, let's move on. If those plans and reports are completed on or before February 1, 2002, respondents shall provide copies to Appellant ACC when complete. And then of course the order goes on and says, even if they're noted on the list, you can't rely on a plan or report that was prepared after February 1.

So you have this operative cutoff date of February 1, if it's prepared after, you can't rely on it, you can't use it, and then in addition you're supposed to provide it. And then beyond that there was a special discovery period leading up to February 28th, so there was an extended discovery period for this purpose only. So if you had a plan or report prepared by February 1, and you've provided it to the appellants, then the appellants would have a little bit longer time, till February 28th, to do discovery on this document.

The problem is here that what Brascher and Ellingson are referring to and what we've also just received some other documents on from Ecology are changes to the low-flow plan and report that were done after the cutoff date, that were provided after the cutoff date, and that therefore have no place in this proceeding. And in that context, I did tell Judge Lucas and I'll tell the presiding officer as well that we of course have said

before that we feel as though we're shooting at a moving target in this case. We would have liked to have had the target stabilized as of September 21, the decision was made to give six additional months, but those six additional months were up on February 1, and I think that's a fair way to go and we think that should be observed.

We also received yesterday in our office in Seattle, when we say "we," Helsell Fetterman, a packet of documents from Ecology. These were apparently sent to us, not -- I've talked to Mr. Kray about this several times and he has told me that these were not sent to us pursuant to discovery, that his feeling is that these are not something that we were entitled to under a supplementation requirement on discovery, they were sent to us because we happened to send out one of our regular -- Andrea Grad sent out a public disclosure request a couple of weeks ago, so we were sent these documents.

They include, for example, a report that is part of changes to the low-flow plan, dated March 6, received March 11, which is apparently related to some of the materials that Ellingson and Brascher are referring to in their testimony. They also include a memo that gave us some pause, it was an e-mail dated I believe February 25, and what gave us pause about the e-mail was that -- and

Mr. Kray knows that we have this and we've spoken about it with Judge Lucas, it's an e-mail from Ann Kenny to Ed Abbasi - and I apologize if I've mispronounced his name - John Drabek, Dave Garland, Ray Hellwig, Kevin Fitzpatrick, Joan Marchioro, Tom Young, and Jeff Kray. The last three of course are the counsel for Ecology. And what it is is Ann Kenny saying: Well, here are these documents we've received and I want to get your feedback as soon as possible so that we can get them finalized and approve the revisions to the low-flow report.

Well, the problem is it's dated February 25, and it seems as if everybody but us knew what was going on here. Now, we did take depositions and tried to track this, and I want to kind of give the Board a little background on that. We took a deposition -- excuse me. The low-flow plan was issued on December 17, 2001, the one that we thought was the revised low-flow plan. So on December 20, we deposed Kelley Whiting, he is the person from King County DNR who is doing the review for Ecology. And in the deposition he said he would be reviewing the low-flow plan in January, so we said okay, we'll continue the deposition till February. January 9th we took Dave Garland's deposition, and I think the Board is familiar with the facts there.

January 30th we deposed Joe Brascher, and he is one

of the persons whose portions of his prefiled we want to exclude. He said he had been in contact with Kelley Whiting and was beginning to make revisions to the model. Well, that's fine, nice, but we had nothing provided, it hadn't been done yet. There was a meeting on February 12th between Ann Kenny and Kelley Whiting and Keith Smith of the Port, at which apparently Kelley Whiting advised on what some of his concerns were about the low-flow plan in a memo, and the testimony in the depositions is that at the end of the meeting Ann Kenny handed the memo back to Kelley Whiting, so Ecology didn't have a copy. Why they would do that, I don't know, but it certainly makes it harder to obtain it from Ecology if they hand back the copy.

Then, as the chronology goes on, Ann Kenny, on February 19th we know directed the Port to prepare a validation report and revised low-flow plan. February 19th. February 20th we deposed Kinney and Ellingson and they say, well, this is in the works but they don't have a product. February 21st, we asked King County for information and we get some information relating to Kelley Whiting's review, but we don't get the product. February 28th we depose Kelley Whiting, and that's the last possible day we could have deposed him under the Board's prehearing order, and Whiting says that he hasn't received

any responsive reports to his concerns that he has raised and he doesn't know when they'll arrive. So that's when our discovery ended, we're at the end of our rope.

So that's where our factual string that we were able to use in preparation for this hearing ran out was Kelley Whiting saying: Yes, I have concerns, but I have no product, I don't know what's been done about them. And as I say, February 28th was the discovery cutoff. So then on March 7, the Port and Ecology submit prefiled testimony and as we're now kind of figuring out from looking at the prefiled, triangulating it with these documents we just received last night, it appears that these revisions have been ongoing well after February 1. No one has told us and no one has told the Board and we're now bringing in the Brascher and Ellingson testimony with the attachments and we don't know in what other ways to respond to these revisions. What we would ask the Board to do again is to delete, exclude the particular items that I've mentioned and also to make sure that the order is worded in such a way that they don't seep in through others' testimony.

I guess just a couple of other points. I know Mr. Kray told me, well, you know, there was some delays in public disclosure response from Ecology because persons were sick and this and that sort of thing and that's why your response to your public disclosure request was

delayed. And I've got great sympathy for staff problems, but we didn't even ask through public disclosure - and we always ask for just whatever you have, we don't say we want this or that - until a week or two ago, and that was our routine fail-safe public disclosure request.

There is an order here, there is a discovery process here, and it's not even our fault and it's not really relevant why there was a delay in the public disclosure response because that request even came long after the February 1 cutoff. And incidentally, I know Mr. Kray said: Well, Andy Grad got our e-mail about we were delayed in that and e-mailed back right away and said she was out of the office and thank you and all of that. Well, actually, as the Board knows, Ms. Grad has been sitting here and the e-mail that she got from Ecology was responded to by a little magic device called auto-reply. So when Ecology sent it to Ms. Grad on March 18th saying we're going to have some documents for you, Any Grad didn't respond, the auto-reply responded saying I'm out of the office in trial. So minor point.

I believe that the Port is going to suggest, because we did talk about this earlier, that it's not a result that they would like to see. Because what they will then be left with is a record in which they have Mr. Whiting come in and say: Yes, there's some problems here and I

don't know how they're going to be resolved. And we don't know what the Port's latest iteration of resolutions to the latest problems are which have come in within the last week or two. And that's true, and we think that's an inevitable and appropriate result. And I would like to speak to that for a moment.

The Board gave in its wisdom and what it thought was out of a sense of fairness, and we respect that, the Board gave the Port and Ecology six, you could also argue seven months, if you remember that the initial 401 was issued in August, to finish the low-flow plan. And of course we won't talk about all of the years before the certification was actually issued. So we had no control over when they got to work on it, when they got done with it, and when they produced it. The only thing that we had to protect us in terms of fairness in this proceeding was: Folks, you know, it's from September to February 1, you ought to be able to come up with a product that you are proud of that you can stand in front of the Board and that we can all use as a basis for this hearing. And what the Port is really saying is: Well, don't blame us, blame Ecology. Whatever, it didn't happen, and they're asking to be allowed to go past that. That will prejudice us greatly. Our folks have come and gone on the low-flow report, and it's really something where we would ask the Board, please

look at it closely, because we think it's a very important point.

Thank you.

MR. REAVIS: Let me just explain what this document that I think is a key document really is and what it is not. It is not a new version of a low-flow plan. And I think the Board yesterday clarified the prehearing order to relate only to documents prepared or expected to be prepared pursuant to the 401 certification, things that were formal aspects of the 401 conditions.

This document is a verification report that is not listed anywhere in the 401, that no one at the time the 401 was issued anticipated that this would be a future deliverable. So how did it come about? And I think the chronology that Mr. Eglick was going through is accurate, but I think there are a couple of other points in there to talk about. And first, the low-flow plan itself was submitted in December of 2001. We believe it was a complete report. We're not suggesting now that we're trying to complete the low-flow report, we think it was complete and covered all of the points. Now, what happened in terms of chronology was that report was submitted to Mr. Kelley Whiting and no one received any comments back from Mr. Whiting until February 19, and there was a meeting that Mr. Eglick referred to with

Ms. Kenny and Mr. Whiting and a number of other people on February 19th, and that's when these comments started coming out. And that's what the Port is responding to now, comments that didn't come to light until after February 1st. So to suggest that we somehow should have done that before February 1st, it simply would have been impossible because we didn't know what Mr. Whiting's comments would be.

Now it's not true that ACC has had no idea of this ongoing process, because the day after that meeting, Ms. Kenny's deposition was taken and there were a couple, at least one exhibit -- two exhibits I think in that deposition that related to this very issue. One was the agenda for that February 19th meeting, and the other I believe, if not produced that day, produced later, were Ms. Kenny's notes of that meeting. And Ms. Kenny testified at some length about what happened at the February 19th meeting and listed all of Mr. Whiting's comments. So that's the first time I think the Port knew what those comments were, certainly the first time ACC knew what those comments were, but it was impossible for the Port to respond to those comments prior to that.

Now, a few days later, Mr. Whiting produced a memo on the 23rd of February, which was an exhibit in this case and which was a deposition exhibit later on, and

Ms. Kenny's notes were also an exhibit in this matter, Number 730, Mr. Whiting's memo is Number 458, the agenda is Number 459. So all of those memos have been in the record for some time now.

Now, Mr. Whiting also in his prefiled testimony mentions all of these issues. He says: I reviewed the low-flow plan, I have a number of additional comments, I've submitted those to the Port. So I think what ACC is suggesting is to leave the record that way, no comments after February 1st, and the Port is unable to respond. If you look at those provisions in Mr. Brascher's and Mr. Ellingson's testimony, all they're trying to do is say we reviewed this comment, we think it's a relatively minor comment but we responded.

If you look at paragraph 13 of Mr. Brascher's prefiled, it's says: I understand that King County has raised concerns about the potential impact of the Miller and Walker Creek calibrations based on the minor changes that have been made to the 1994 land use conditions. These impacts have been examined and have been determined to be inconsequential. Our elevation of these impacts were summarized in the calibration verification report recently provided to the county.

Now that's the document that I think we're talking about here, all Mr. Brascher is saying is we believe

Mr. Whiting's comments are very insignificant and we've complied with his request to submit this document. We are not offering this document that Mr. Eglick is talking about, it's not on the exhibit list, we're not suggesting the Board consider it, we think Mr. Brascher ought to be at least allowed to say that he has reviewed those comments, doesn't believe that they're significant, and he has responded by giving the deliverable that's been requested.

And really Mr. Ellingson's comments are much the same, he says that Mr. Whiting subjected a couple of modifications to two tables in the low-flow plan, and we've revised those tables and here they are. It's a very minor issue, it is to a certain extent an addendum to the low-flow report, but it's very insignificant and that's all Mr. Ellingson is trying to say in his testimony.

Now these particular documents I don't believe are the type of documents that were covered by the prehearing order, first off, no one could have anticipated that they were to be delivered, so there's no way anyone could have listed them by November 15th, we couldn't have produced the documents either by February 1st, because there was no knowledge of them. But also I think these are the types of documents that everyone anticipated would be generated during implementation of the 401, when additional

questions came up the questions would be responded to, and work on the 401, as I'm sure you recognize, has not ceased during this lawsuit and this is just one of the documents which has been generated which, to repeat myself, we are not even offering here.

We think it's really fundamentally unfair for ACC to leave in Mr. Whiting's testimony saying he has outstanding concerns with the Port's low-flow plan and then prohibit the Port from responding to that. And I don't hear ACC suggesting that we simply strike Mr. Whiting's testimony and put us back to the situation we were in before February 1st. That would be one fair way to deal with this, but if you're going to leave Whiting's testimony intact, it seems only fair for the Port to be able to respond.

I think Mr. Kray wants to talk about some of the procedural aspects. But we believe that these portions to this testimony and the two exhibits to Mr. Ellingson's prefiled testimony should not be stricken.

MR. KRAY: Ms. Cottingham, I thank you for the opportunity to discuss those aspects. But I don't think those are the issue. My sense from hearing Mr. Eglick and Reavis is that there's a larger issue here, it comes back to much the same issue as you ruled on yesterday with regard to the prehearing order and where the cutoff is and

things like that, what is related to the 401 and what is deliverable under the 401 and that type of thing. My sense is that the Department of Ecology's public disclosure response providing information is merely a vehicle for the ACC to raise this issue, and I think it's the same issue that the Board as already addressed.

I do have information, I can give you some more details about how I think Ecology properly carried through its duties under the Public Disclosure Act and produced the documents in a timely fashion. I can say on behalf of Ecology that I think they have been doing a very good job in trying to keep up with a high volume of information, I think they've taken special efforts with regard to the nature of this case to try to get documents out, I think they did so here. There may be a couple of instances where there were some documents did not quite get handled the way we would like, we did have some personnel that were out, but the delays were relatively minor and I think the overall information had been conveyed. But as I said, I really don't think that's the thrust, I think the Port and Mr. Eglick have addressed the real core issue for the Board and I won't take any further time, unless you have questions of me.

MS. COTTINGHAM: I don't have any questions. I do have general questions, but I'll ask them after I get

all of the argument out.

MR. POULIN: Ms. Cottingham, if I might just very briefly. I might say I admire Mr. Eglick's civility, but on behalf of CASE, I would like to comment on Ms. Kenny's affirmative act of returning the report to Kelley Whiting. If that's not a clear example of Ecology purifying the record so that they did not have any producible documents to give to ACC in response to these requests that are routine, I don't know what is. I've never heard a bureaucrat saying: No thanks, I don't want a copy of the support report for my files. Clearly, there has been an organized, knowing effort to block the kick and to prevent ACC from finding out what's going on with this very crucial report, and I think it's had a clear prejudice and it's playing out right now.

MS. COTTINGHAM: Would you like to have rebuttal?

MR. EGLICK: I would briefly.

I think I heard the word "inconsequential" at least three times. I guess if it's so inconsequential maybe we should just exclude it and it won't be a problem. I think the reality is that these attachments to, for example, Mr. Ellingson's testimony are not inconsequential, they're replacement pages for parts of the low-flow report. Although they dismiss criticisms as being minor and

inconsequential, they have now come up with replacement pages that they want to have inserted that change the analysis. I believe that they relate to the same kind of issue, maybe the same issue as in this verification report dated March 6, produced by the Port, and remember we got this through public disclosure from Ecology, we didn't get it from the Port or from Ecology in this case as we were supposed to.

And the first paragraph or page one of this document says: The purpose of this technical report is to document the -- and they say minor changes that have been made to the Miller and Walker Creek HSPF SMP calibration models for the low-flow report, 1990 target flow conditions for the low-flow report. It's exactly what was contemplated, it's within that core, it's the very thing. And it's true, and I hope I didn't misspeak, I think I made it very clear we knew the process was going on and we kept on trying to get inside of it, even taking Kelley Whiting's deposition on the last day we could have, the continued part two of his deposition, February 28th, and as far as we got there nothing was done. So that is where it was left, we knew Whiting had concerns, nothing had been done to revise the report. Process is great and knowing there's a process it's very nice that they kind of let us know there was a process, but we should have had whatever

changes, substitutions, alterations, minor, major, inconsequential. And that's the issue here.

There is a difference between the Kelley Whiting testimony and what they want to offer, the difference is of course first of all we're entitled to have anything in up until February 28th, because we were given the opportunity until February 28th to take discovery and we did. It would be unfair to cut us off before then and exclude Mr. Whiting's comments. It would be fair to enforce the February 1st cutoff because that gave the parties six or seven months. And that's the answer to that in terms of why it should come out that way. The other way would leave us I think in a very disadvantageous position, and what the Port and Ecology would have accomplished is exactly what we asked the Board to prevent back in October and I think the Board agreed to prevent, and that was so that we wouldn't be dealing with a moving target up until and through the hearing.

I would be happy to answer any questions.

MS. COTTINGHAM: I did not write down while you were speaking a couple of dates, so I'm going to ask for clarification. Because I think what's before us is not the public disclosure issues but rather the discovery deadlines that I set forth in the prehearing order. So we have different aspects, one, we have the plans and

reports, and then we have the entirety of the exhibits outside and including those plans and reports. So in the prehearing order I had set forth a discovery deadline of February 1st and then an extended period until February 28th and to have exchanged exhibits by February 8th. I did not set forth in the order a second exchange date for those later discovered, later deposed issues between the February 1st and February 28th; but that being what it is, the dates we have before us are February 1st, February 8th, and February 28th. So can you tell me from the information that you have in front of you some of the operative dates?

MR. EGLICK: Well, I'm not sure I'm going to -- let me know if I'm not giving you the most useful information, but I guess the place to start is we did not have these proposed replacement pages or even know that they existed until whatever date the prefiled was, and of course we didn't look at the prefiled right away because we were looking on a few other things like our trial brief, but we didn't have those until March 7th. We did not have these background materials from Ecology that kind of put it all in context of what these pages are from and how they were created until Mr. Stock went to the office last night and found the materials there. And I should add because I neglected to that we were also given --

Mr. Stock found in the office last night three CDs of data, because when you do these new things for the low-flow report and substitute in different calculations in the low-flow report, apparently the way you do that is you have a lot of modeling numbers and the CDs are apparently these runs of numbers that we just got yesterday evening. So those would be the operative dates, if I'm giving you the information you wanted.

MS. COTTINGHAM: You did.

Now I would like to ask -- maybe it's more Ecology, but I'll ask the two of you to respond. Given the deadlines set forth in the prehearing order, how can you justify allowing this information in beyond those dates? Do you have any rationale, any legal argument? I understand the evolving nature, but we did set forth that there would be a cutoff point for reliance. We weren't asking that everything stop and be on hold, but we did authorize, as Mr. Eglick said, six to seven months of continuing documentation to be compiled; but then at some point in time, it would not be allowed to be relied upon.

MR. REAVIS: If I could speak first. I think the first issue we have with regard to the March 6th document that seems to be the gist of Eglick's complaint, we are not offering that. I think the cutoff dates we're talking about here are for documentary evidence to be

produced. We're not offering that document. So I think the only question is the exhibits to Mr. Ellingson's testimony and, frankly, if he is not allowed to use those two exhibits, I don't think that's the point here, I think the point here is with his testimony he would like to say I have evaluated Mr. Whiting's comments, they are minor and we have addressed them. So I don't have as big a problem with the documents themselves as I do with not allowing our witnesses to say we've heard Mr. Whiting's comments and those comments really don't make a big difference to the low-flow analysis. So I think that's the critical piece here and in reality we simply could not have formulated that testimony earlier than we did because the issues didn't even come up.

MS. COTTINGHAM: And Mr. Whiting's comments were the February -- you had a date in there?

MR. REAVIS: The actual document that incorporated those comments was February 23rd.

MR. EGLICK: Well, I think what Ms. Paschal-Osborn, who took some of these depositions, so she is more familiar with the facts, is reminding me is that Mr. Whiting -- and we were kind of outside the box and kind of feeling in the dark, but he apparently started making drafts of his comments which he was sharing in January. So I don't know if it makes any difference in

terms of what you're trying to decide, but word was going out about what he wanted to have corrected before he got out his final version, and I think that's where we got into that situation where Ann Kenny was not holding onto a document that he had prepared because it wasn't the final one so she didn't want to keep it -- or she did keep it, I don't want to characterize her intent.

MR. REAVIS: If I could respond to that. I think that this transmission of information that Mr. Eglick is referring to may have been going on between Mr. Whiting and Ecology, I don't even know about that, but the Port wasn't in the loop at that point, I think they were having maybe preliminary discussions, but we're the people that had to respond to the comments and we didn't get them, to my knowledge, before at least this February 19th meeting in some general form, and then the actual written comments on February 23rd.

MR. EGLICK: I think, you know, I am advised and I believe that in the Brascher deposition he talks about being in contact with Mr. Whiting about beginning to make revisions, and that's on January 30th. I don't want to kind of devolve this into that because I think the issue is of course if you start early you don't end up arguing about January or February, you just have it done; but I think it's not quite the way it's being described, Mr.

Brascher actually who works with the Port was on top of this before February. We weren't in that loop, but that's what the deposition brought out.

MS. COTTINGHAM: I think we're going to take a little bit of a break here, I am going to have a thought process either with myself or others, and we'll come back maybe in about ten minutes. So we'll go off the record and take a recess here.

(Recess).

(The following proceedings were had in the presence of the full Board)

MS. COTTINGHAM: We'll go back on the record.

Before our break, we had a motion by ACC to limit or strike certain testimony, both prefiled testimony and the live testimony that we'll be getting later today, I assume, related to some issues that appeared subsequent to some deadlines set forth in the prehearing order. Here is the ruling, and this will be memorialized in writing and we'll pass it out to you either later this afternoon or tomorrow.

The prehearing order was clear. We had a long discussion in the prehearing conference about there needs to be a cutoff for discovery purposes. We fully recognized that as this hearing would proceed and the timeframes that there be would be some evolution of things

but we did set some pretty clear cutoffs. We set February 1st for a cutoff, and for some plans and reports that were expected to be completed we set a February 28th deadline.

Therefore, with those deadlines in mind, any party is prohibited from relying on information created after February 28th. This motion, the prefiled testimony, direct, cross, et cetera, can elicit how Ecology or the Port felt about or evaluated the comments of Kelley Whiting produced on or before the discovery deadline, but these witnesses may not indicate what the Port or Ecology has done since February 28th to revise, clarify, explain or modify the low-flow plan.

With this ruling the parties need to let me know to identify which paragraphs in the prefiled testimony and which attachments need to be redacted.

MR. KRAY: Your Honor, may I make one comment on the order?

I guess I have concern about the breadth of the order. These expert witnesses in this case for all parties are formulating thoughts, coming up with ideas during the course of this hearing, and my concern with the breadth of the order is that it arguably prevents anybody from doing any work, whether it's just some minor math or something. So where do we draw the line in that regard?

MS. COTTINGHAM: The experts can talk about

their thoughts about the comments, about their evaluations, their concerns, their whatever evaluation they did, but they cannot say "as a result of this the Port has done that," if that was done after February 28th. So I'm not intending to limit their expert opinions, their analytical process, it's just what as an official action the Port or Ecology has done as it relates -- and their motion related to the low-flow plan, so as it relates to changes that have been made to the low-flow plan. We had to have a date by which everyone could prepare for this hearing and so that's why we set the February 28th deadline.

MR. KRAY: I think the words that caught my ear that I think helped guide me on this was the phrase "official action," and I guess to the extent an expert is -- regardless of the party it's from, doing some more analysis, working on some more math or doing some more research, the parties would be allowed to testify about that?

MS. COTTINGHAM: That is my understanding, but if they're going to recommend that the Port do X, I think the recommendation process would also be part of an official action, so I would like not to have that come forward.

MR. EGLICK: The cutoff in the prehearing order

for the report itself or plan itself was February 1st, and then we were given -- I think any report or plan we were supposed to have by February 1st, and then they had the period from the first to the 28th to take discovery on the new report or plan, and that's the way the order reads.

MS. COTTINGHAM: Mr. Whiting's comments are not an official plan or report.

MR. EGLICK: Right. And Mr. Whiting's comments, I think it's absolutely correct they come in, because it's not a plan or report, it's comments he made and that we became aware of during the discovery period.

What I am concerned about is the structure of the ruling would allow the respondents perhaps to say: Well, we didn't have an plan or report or disclose one or produce one by February 1, but what we're going to do is have our folks talk about what further thoughts they had after February 1, that weren't an official act but will be the same thing, and of course will be the same problem, how do we cross-examine, how do we take discovery on, it's not something that we had in front of us until very recently. So if I can have some indulgence here because Mr. Kray has asked for some, as well. What we would ask the Board to do is to say no plan or report -- well, the order says it's prohibited from relying at the hearing upon any plan or report prepared after February 1. And

that would include any unofficial planning or reporting that they later created that they later turned into a plan or report after February 1. So February 1 would be a bright line cutoff date and I think we end up in a lot clearer context. The only reason Kelley Whiting's testimony comes in at all is because we took his deposition and he happened to say: These were my concerns.

MS. COTTINGHAM: I'm not willing to change my ruling. The bright line for purposes here today is the 28th of February.

MR. EGLICK: Okay. I appreciate that and I certainly respect the Board's decision on that. We would hope the Board though would not interpret it in such a way that we will end up -- and I don't want to make a prediction, but I'm concerned that we'll end up with a witness coming in and saying: Well, I knew Kelley Whiting had some concerns because we were hearing about them in January and February, so I did some work on it. And of course no one will be able to say that work turned into a new report page but they'll say "I did this work and here is how I responded to it" and all of that, and we're stuck in the same position as if it were a new plan or report, we don't have discovery on it and we won't have our experts ever having looked at it. In some ways it sets us

back in the same way as if we had not brought the motion, it almost makes it a harder target to put a finger on. Maybe what I should do is ask the Board to be sensitive to that as it comes up and interpret the ruling in light of that concern.

MR. REAVIS: Can I just make one comment?

We went through a whole discussion and motion a couple of days ago about Dr. Lucia. I think that's exactly what they're asking Dr. Lucia to do now is to evaluate the Riley report that he had before February 28th and come up with more opinions and show up again in this hearing to testify. So we're going to be in the same position Mr. Eglick is complaining about, about new opinions we haven't had a chance to do discovery on. So it seems to me that the proper ruling is one I think that you've described, that if we're going to say as a result of our thought processes we're going to submit something that is a part of the low-flow report, then we're not going to be able to testify about that. We ought to at least be able to testify about our analysis and Mr. Whiting's comments and any opinions that we believe relate to those comments, such as that they're major or minor or whatever.

MS. COTTINGHAM: I'm not going to allow any more arguing back and forth. I will be mindful of your

request to be mindful of that, and what I would want for you to do is to raise it and to show prejudice.

MR. EGLICK: Should we go ahead and provide you with a list of items that we would like to have excluded as a result of your ruling?

MS. COTTINGHAM: Let me tell you what I have in front of me. For Mr. Brascher's prefiled, paragraph 13, 37 and 38, which of those is directly related to the ruling today.

The second one is Mr. Ellingson's direct prefiled, paragraph 18 and Exhibits C and D.

MR. EGLICK: I think those are the ones that we listed, so those were the core of it. Of course we don't know what testimony will come around.

MS. COTTINGHAM: But on the written stuff from a redaction point of view, do those paragraphs fit within the narrowness of my ruling is the question I have for you.

MR. EGLICK: Maybe we could have a little time, because the ruling I guess --

MS. COTTINGHAM: Maybe somebody who is not involved in the next witness could do that, from both sides, and let Mr. Lucas, who is in the back of the room, know those.

MR. EGLICK: Thank you.

MS. COTTINGHAM: And with that, we've finished up with Dr. Willing, I believe.

And your next witness.

MR. STOCK: At this point ACC will call Mr. Wingard to the stand.

GREG WINGARD, having been first sworn or affirmed to tell the truth, the whole truth, and nothing but the truth, testified as follows:

EXAMINATION

BY MR. POULIN:

Q Mr. Wingard, I would like to have you look at Exhibits 360 and 361.

MS. COTTINGHAM: Have you started the clock?

MR. POULIN: Yes, I have.

Q These are deposition exhibits.

A Yes.

Q Have you seen these documents before?

A I have.

Q Would you please describe what they are?

A They're analytical reports of samples taken on Monday and Thursday, site visits to SeaTac airport.

MS. COTTINGHAM: May I interrupt for a minute. Can you do some basic introduction of your witness for the

record.

MR. POULIN: Yes, I can.

Q Mr. Wingard, you presubmitted prefiled direct testimony, did you not?

A I did.

Q And you have testified as a fact witness?

A Yes.

Q Could you briefly for the Board describe your background with SeaTac issues, generally?

A I started working on SeaTac Airport in 1994. The subject was the appeal of an NPDES permit. I subsequently have worked on many matters related to SeaTac Airport, reviewed their discharge monitoring reports from 1994 to date, I've done code sampling with Port staff of two SeaTac airport outfalls, I've done several site inspections at the airport, both historically and the most recent ones, and I have reviewed documents related to cleanup and construction, water, wastewater, engineering reports, and that about covers it.

Q And are you presently employed?

A Yes.

Q Could you describe your affiliation, I guess?

A Yes. I'm working as a consultant with the Airport Communities Coalition and I'm also working with the Regional Coalition on Airport Affairs.

Q Are you involved with an organization called the Waste Action Project?
A Yes, I am. I'm executive director.
Q And what is that organization?
A Waste Action Project is an environmental organization that does enforcement of environmental law and education related to primarily the Clean Water Act.
Q Thank you.

Now, back to Exhibits 360 and 361. Did you say these were lab analyses of samples taken, water samples taken during ACC's site visits to SeaTac?
A Yes.
Q Were you involved in that sampling effort?
A I was.
Q If you look at the second page of each of these exhibits, do you see a document called the chain of custody record?
A Yes.
Q Did you fill that out?
A Yes, I did.
Q Would you please briefly describe what that's for?
A Basically it's to document the collection and custody of samples from the point they're taken in the field to the point they're put in the hands of professionals at the laboratory who are going to analyze the samples.
Q Now you've stated you were involved in this sampling

effort. Would you please describe your involvement?
A Yes, I assisted in preparing labels for the samples and in storing them in the cooler for transport to the laboratory.
Q What were the samples taken in?
A The samples were taken in lab wear that was prepped and provided by the accredited lab, Analytical Resources.
Q Did the lab know what types of constituents you were sampling for?
A Yes, they had been provided a list of the parameters that we were interested in having them analyze, and they provided the appropriate glassware or labware for that.
Q Were you involved in the process of deciding what to sample for?
A Yes, I was.
Q And how did you come to pick these items identified on the chain of custody form?
A Well, given review of the discharge monitoring reports for the Port over the course of '94 to present and the annual stormwater reports and the receiving water report, it seemed that these were parameters of concern that would reveal useful information in determining how the Port was either meeting or not meeting water quality standards and how BMPs were performing for those outfalls.
Q How did you pick which outfalls to sample?

A Well the outfall which is SDS 1, the Olympic Tank Farm, I noted problems there before. SDS 3, because it's a large area of the airfield, so it's significant in that there's very little -- the majority of the contributing basin belongs to the Port, there's very little extraneous input and it's also a majority of the airfield area, so what's coming off there is typical of what's coming off of the industrial use of the airport.

MR. POULIN: At this time, Your Honor, I would like to offer these exhibits for the truth of the matter. They were previously admitted subject to hearsay exception.

MR. KRAY: No objection from Ecology.

MR. PEARCE: No objection.

MS. COTTINGHAM: So admitted.

Q (By Mr. Poulin) Could you please briefly orient the Board in these documents to show where the sample results were found?

A Sample results start on the -- after we turn past the chain of custody, you'll see a variety of data pages that discuss the sample results, you'll also see lab matrix and blank results and matrix spike results which are quality assurance/quality control measures that the lab takes to assure that the samples are accurately reporting the contents of the sample from the field and you aren't

getting extraneous results from either lab contaminants or procedures that are improperly applied.

Q And so do you see a page that actually identifies what the lab found, the results of the sample taken at SeaTac?

A Yes, there's two pages referred to as glycol sample 001, and then there's a 001 matrix spike, and a spike duplicate. So the first page is the sample results, and the following two pages are quality assurance information, as is the following page.

MS. COTTINGHAM: Can you explain to the Board how you know that? How do you distinguish the between the pages?

THE WITNESS: Sure. If you look up in the right-hand corner where the logo for the company is, you'll see a sample number identification, which is sample 001, and then you go down and it will give the lab sample ID number, and at the bottom it'll indicate a column of three items on the left-hand side. It says lab sample ID, column ID, and matrix. Under matrix, it says water. And then it says propylene glycol, 13 milligrams per liter, in the data section. So that's sample results.

Q (By Mr. Poulin) And is what you're describing the fourth page of the exhibit, Exhibit 360?

A That's correct.

Q Then if you turn to page --

A The fifth page?
Q I'm looking past that, I would like to show the Board a metals sample.
A Well, I just wanted to mention for clarification, if you turn to the following page where it says sample number 001, it says matrix spike, and that's what indicates that it's a lab sample, a lab quality assurance sample rather than a field sample result.
Q And then the following page, which is still talking about sample 001 there, that says spike duplicate?
A Yes.
Q Is that another element of the quality assurance/quality control process?
A Yes. It basically qualifies that the lab failed to replicate the result in that it assures that the equipment is functioning correctly and the personnel have done their job right.
Q Okay. And if we turn all of the way back to what would be page 10, you'll see in the top center, in bold, it says: Sample number: 004?
A Yes.
Q Are those the actual lab reported results of the metals analysis for calcium, copper, magnesium and zinc?
A Yes.
Q And it also reports the hardness?

A No -- oh, yes, it does, at the bottom.
Q Okay. Now, briefly, have you been involved in sampling efforts before?
A Yes.
Q Have you been trained in the proper methods of taking a sample?
A Yes.
Q Have you taken samples pursuant to a written sampling protocol?
A I have.
Q In this instance, did you adhere to your experience in taking samples?
A With minor exception.
Q Please explain?
A I didn't have gloves at the time I sampled, which I would have preferred to have had.
Q And have you reviewed that in any way of what went into the bottle?

MR. PEARCE: Mr. Poulin has represented this witness as a fact witness. We weren't sure whether he would be a fact witness or if he would try to qualify him as an expert, he is being asked to provide an expert opinion about whether using gloves or not using gloves makes any difference in a fairly complex scientific sampling procedure. I don't think he can qualify it, he

is not presented as an expert witness.

MR. POULIN: What I meant to ask is whether the water sample that poured into the bottle had any opportunity to come into contact with his gloveless hand before it did so.

MS. COTTINGHAM: With that restatement of the question, I'll allow it.

A No. The sample container mouth was placed upstream of where my hand was, meaning the flow of water was coming into contact with the top of the bottle before coming into contact with my hand, there wasn't an opportunity for the water to go upstream and get back into the bottle.

Q I would like to turn to a separate aspect of your prefiled statement in which you discuss various examples identified as construction site stormwater monitoring reports. And those include Exhibit 7, Deposition Exhibit 7.

A I don't believe I have that in front of me.

MS. COTTINGHAM: They're not numbered for us, they're alphabetized.

MR. KRAY: Is that the prefiled exhibit or the deposition exhibit?

MR. POULIN: The exhibits are included with his prefiled as Exhibit B, as I recall, the same exhibit is also his Deposition Exhibit 7. Pardon the confusion, if any.

A Yes?
Q And my question is, could you please briefly explain what this document is?
A The document is a report of sample results from one of the construction sites at the SeaTac airport, one of the third runway related construction sites.
Q Were you involved in obtaining this report for the ACC?
A Yes, I was.
Q How did that come to happen?
A The Department of Ecology had done a major modification to the NPDES permit for SeaTac International Airport, and I commented on that particular proceeding; subsequent to that, Ecology prepared a responsiveness summary and that responsiveness summary referred to construction site monitoring and also upstream/downstream monitoring of each phase of construction related to the third runway at the airport. With that specific information, I requested all related documents from Department of Ecology in June and asked again in August under the public disclosure laws. That information was not provided to me over some period of time up through October, where I involved the Attorney General's Office, then got a call from John Drabek at Department of Ecology informing that the reason that Ecology could not supply the documents was because they didn't have them and that I had to contact Tom Hubbard at

the Port of Seattle in order to get these documents, which is what I did.

Q Now, in response to your prefiled testimony, Ecology's Kevin Fitzpatrick addressed you by name in his prefiled testimony, have you reviewed his statement?

A Yes, I have.

Q Could you please provide a response, if you would.

MR. KRAY: Objection. Vague.

MS. COTTINGHAM: Sustained.

Q (By Mr. Poulin) What's your understanding of Mr. Fitzpatrick's response to your suggestion that these reports show turbidity violations at SeaTac?

A Well, Mr. Fitzpatrick has stated in his prefiled testimony that these sample results are not indicative of impacts to waters of the state, they're simply upstream/downstream of BMPs or structures within the overall stormwater system at SeaTac airport. I don't believe that's an accurate assessment, as some of these sites directly refer to waters of the state, such as Tyee Ponds, for example. Also there's comments, and in the comments that are associated with these, there will at times be an item in the comment box which says more than five NTU above background or above the upstream concentration notified, and then somebody's initials who they notified. The significance of the five NTU above is the state water

quality standards which are found in the WAC 173-201A-040, and that when they refer to five NTU above they are referring to the water quality standards, which wouldn't be of any significance if you're only looking at the performance of a BMP, it's only of significance if you're looking at the potential impact of the water quality, i.e. the receiving water.

MR. KRAY: Objection. Lack of foundation for him to testify as an expert. Move to strike the entire answer to the question.

MS. COTTINGHAM: Do you have a response to that, Mr. Poulin?

MR. POULIN: I believe that much of his testimony is based on the factual content of these exhibits and his understanding of what they mean. I don't believe that requires an expert opinion. Certainly a percipient witness can have an opinion about what particular facts mean, and I'm sure Mr. Wingard could explain the basis for his statements from the exhibit.

MS. COTTINGHAM: Why don't you lay a foundation for him to do that.

MR. POULIN: Sure.

Q If you will look briefly at Exhibit 7?

A Yes.

Q In the first column, there's a rather -- yes, in the first

column you'll see under the logistics site development there's two rows that mention Tyee Pond, one says US, one says DS?

A Yes.

Q Have you seen that terminology or usage in monitoring reports before?

A In regard to these monitoring reports, yes.

Q What does that mean?

A Upstream/downstream.

Q What does this report indicate downstream discharge is?

A The outfall of Tyee Pond to Des Moines Creek.

Q And Des Moines Creek is not part of SeaTac's stormwater facility is it?

A No, it's a water of the state.

Q And if you turn to the second page of that exhibit?

A Yes.

Q And the lower-right corner of the table?

A Yes.

Q Does that indicate the notation that you were referring to downstream/upstream? Please explain.

A It says downstream/upstream greater than five NTU, notify KL and DJ.

MR. POULIN: No further questions.

MS. COTTINGHAM: Ecology or the Port, cross.

MR. STOCK: I do not have any.

MS. COTTINGHAM: Ecology?

MR. PEARCE: Yes, I guess I'll go first.

EXAMINATION

BY MR. PEARCE:

Q Good afternoon, Mr. Wingard. My name is Roger Pearce, I'm one of the attorneys for the Port of Seattle.

Tell me briefly about these turbidity reports. You didn't take these samples, did you?

A No.

Q Do you know who took them?

A No, I don't.

Q Do you know whether they were taken with a field turbidimeter or collected in a bottle and given to a lab?

A I am not aware of that, no.

Q Are you aware of what it takes to calibrate a field turbidimeter and how likely it is to be off slightly?

A Yes.

Q How likely is it, what's the range of fluctuation of field turbidity, if you know?

A It's not possible to answer your question.

(Pause in proceedings).

MS. COTTINGHAM: We are going back on the record.

Is the clock timing for the right party? For whom

the bell tolls.

MR. POULIN: We are back on.

Q (By Mr. Pearce) The turbidimeter is accurate to one tenth of an MTU, or do you know?

A NTU?

Q Thanks for the correction. One tenth of an NTU or not?

A It's really not possible to answer your question. You're asking me to speculate about a large number of instruments that would have varying sensitivities under conditions that I was not present to witness.

Q Okay. Let's look at the Exhibit 7, the first page of it. Tyee Pond is an instream stormwater facility, isn't it? If you know.

A Yes, I would describe it as that, and potentially also it's a water of the state.

Q How about the air traffic control tower on the next page. Do you know where that's located?

A Air traffic control tower?

Q I'm sorry, do you know where the sampling locations are located?

A SDE 4 is a designation for the east side of the airport, that would be a discharge to Des Moines Creek.

Q So your testimony is that the site discharge is to Des Moines Creek. Do you know where these turbidity readings were taken?

A I don't have the map in front of me which provides the sample locations which these numbers are coded to. The numbers refer to manhole designations for the stormwater system for SeaTac airport, and those are designated on a map and I don't have that map in front of me.

Q For everyone else's and my edification, those numbers are -- is that SDE 4-948 on the next to the bottom line there, and SDE 4-958?

A Yes. That would be a storm drain on east side. Four is the basin number and 948 would be the sample location.

Q So those are manhole covers somewhere and you're not certain where they are?

A That wasn't my testimony. My testimony was they're on the east side of the airport.

Q Are they manholes? I thought you said they were manholes.

A They're usually manhole structures that are labeled, they are numbered.

Q Okay. Any idea how far from a stream these are?

A These specific numbered ones?

Q Yes.

A Not exactly. There's quite a few linear feet of piping at the airport.

Q You also testified I think about STEP north. Does that mean south terminal expansion area north?

A That sounds correct.

Q Is that another temporary construction testing point?
A It's a construction sampling location, I believe so, yes.
Q Do you know where the turbidity sampling points were for that temporary construction sampling?
A Which page of the exhibit are you referring?
Q You had a chart in your testimony, I'm just -- STEP north ductbank is the very next page of Exhibit 7. Its location is SDE 4-059 and SDE 4-064. Do you know where those are?
A I have seen a replacement on my exhibit.
Q Part of these don't have --

MR. POULIN: Is this the third page of Exhibit 7?

A It's the third page of Exhibit 7.
Q The middle entry there.
A Thank you.
Q I just wondered if you knew where those sampling designation points were, 4-059 and 4-064?
A Without the map that shows the coding for the sampling locations, it's not really possible to point out to you.
Q So you don't know whether they're instream or not?
A I don't -- what are you asking me?
Q You don't know whether they're in a stream or not?
A In a stream. I would assume that they're not, but I don't know.
Q And you I think testified about --

A I'll correct that. It says: Outfall of culvert under sidewalk on west of entry drive. Outfall would suggest that it's a daylighted water and not a piped water at that point.

Q Does the site discharge relate to the sampling point in your understanding, or is that different?

A Site discharge is different, because if you take a look at the SDE 4 number designation for location, it's different from the upstream/downstream numbers that are explained underneath that entry.

Q How about the next entry down, the south terminal expansion project, also known as STEP, S-T-E-P, is it not?

A Yes, it is.

Q And the same question for those testing locations, it's the same upstream location, isn't it, SDE 4-059?

A Yes.

Q And downstream location is SDE 4-074?

A Correct.

Q And do you know where those are located?

A I think I've already testified to the fact that I would need the map that has the coding for those designations. Generally where it would be is within the SDE-4 basin.

Q You talked a little about the samples from the site visit in your testimony here today. Are those readings averaged over an hour or are they instantaneous readings?

A They're instantaneous, they're grab samples.
Q Thank you. And they were taken at those two outfalls and not instream, correct?
A They were taken -- which samples are you referring to?
Q I thought you had testified they were taken at two different outfalls, SDS 3 and SDS 1, is that correct?
A That's correct.
Q Okay. But that's not instream?
A That's not correct.
Q Where did you dip into the stream to get the SDS 1 outfall?
A The SDS 1 outfall is located on the east branch of Des Moines Creek and samples were taken both instream and at the point of discharge at the outfall.
Q You provided some testimony about Black River Quarry soils. Are you aware of any quantitative analysis showing whether any of the constituents in those Black River Quarry soils would mobilize in groundwater in an amount that would violate Washington State water quality standards?
A I'm not sure what you're asking me. My testimony was a concern that the soil itself, given the results that I saw here, would have the opportunity to mobilize in the totality into waters of the state, and, yes, that would violate water quality standards.

Q So your concern is that the soil itself would get washed into a stream somehow?
A From the results of monitoring of construction that I've seen from the Port, from 1998 to October of 2001, it shows the BMPs have been ineffective in controlling turbidity in a way to meet the water quality standards of the State of Washington.

MR. PEARCE: I move to strike, Your Honor, as nonresponsive.

MR. POULIN: I think that's directly responsive, Your Honor. He is asking about the likelihood that metals will result in the water.

MR. PEARCE: He is also offering an expert opinion.

MS. COTTINGHAM: I'm going to sustain the objection to strike.

Q (By Mr. Pearce) I guess what I'm asking, Mr. Wingard -- well, let me ask first, do you know where these soils are placed at the airport, if any soils have been taken from the airport?
A No, I've asked that question and no one seems to be able to answer it.
Q So you don't know where they were placed as you sit here today?
A I know generally where they're placed, there are a couple

of soil stockpile areas.

Q Are you aware of any analysis showing whether these soils, even if they were carried into the streams, would result in a violation of water quality standards, any sort of quantitative analysis?

A The quantitative analysis is right here, these are construction projects of the same sort as the earth moving that you're talking about with the material placed in the embankment. The BMPs are the same kind of BMPs that are in place for these construction projects.

Q Let me rephrase the question. Are you aware of any back calculations that would indicate how much if any of the constituents in these soils would leach out into the water, come into contact with water?

A I'm not aware of what you're asking in terms of back calculations, back calculations of what specifically?

Q Of the constituents in the soil, as to how much of them would leach out into water?

A Such as the copper?

Q Well, whatever constituents are there of concern. Let's take copper.

A That would be a little difficult to tell without taking a sample. That's why you do water quality sampling.

MR. PEARCE: That's all I have. Thanks.

MS. COTTINGHAM: Mr. Kray. Any questions?

MR. KRAY: I do.

EXAMINATION

BY MR. KRAY:

Q Good afternoon, Mr. Wingard.

A Good afternoon.

MR. KRAY: I would like to begin by drawing the Board's attention to Mr. Wingard's prefiled testimony at page three, paragraph 6, the second full sentence. The sentence reads: The construction stormwater monitoring report shows repeated violations of the Washington State water quality criteria for turbidity as found in WAC 173-201A-030. I move to strike that as a legal conclusion.

MR. POULIN: I object, Your Honor. I believe it's a matter of similar arithmetic. The turbidity criteria is the number five, five NTU. Any person can subtract the downstream number from the upstream number and determine whether it exceeds that criteria.

MS. COTTINGHAM: I'm going to allow that to stay in here, but the Board will give it due weight.

MR. KRAY: I have a similar objection with a substantial portion, and I'll just for the record note the portions that I'm making objection to and I'll either address them -- well, just for purposes of moving along,

lines 24 through 27.

MS. COTTINGHAM: What page are you on?

MR. KRAY: Of the same page, the next sentence, it's says: Turbidity is violated. The term "violated" this water quality standard shows up on the first word on page four.

"Violation" shows up again in line three.

Line 8: Exhibits show the following violations of water quality criteria for turbidity.

Line 10: Examples of violations of water quality.

Line 27: Apparent violation of the permit.

MR. POULIN: Your Honor, I'm quite surprised to hear these motions to strike. Respondents have had this prefiled statement for a month, if I'm not mistaken.

MS. COTTINGHAM: And the Board overruled his objections. He is just noting it for the record.

MR. KRAY: I'm on my time, Your Honor.

MR. PEARCE: I don't mean to interrupt, but we just now found out he was a fact witness and not trying to be qualified as an expert.

MR. POULIN: We filed a witness list that did not include Mr. Wingard as an expert.

MR. KRAY: I'll be as quick as possible, given it's my clock.

Page five, line 3.

Line 6: Violations.

Line 11 and 12, actually 11 through 19, are all one continuing legal conclusion.

And I believe that's all, Your Honor.

Q You are an environmental consultant, correct?

A Yes.

Q In your capacity as a consultant, do you advise groups interested in environmental issues? Is that correct? Very broad terms?

A Yes, among other things, yes.

Q I note your resume` says under the heading "environmental expertise," project management, negotiation, pre-litigation and litigation support. And it goes on. I was just trying to capture that as you advise groups in environmental issues, right?

A Groups and individuals.

Q Your consultation work includes participating in suits under environmental laws?

A Yes. That would be fair.

Q In fact your resume` says you've directed over 30 cases brought under federal environmental laws?

A Yes.

Q Are you aware of laws allowing private citizens to file lawsuits against parties alleging violations of NPDES permits?

A Yes.
Q Have you or any groups you've represented participated in lawsuits alleging violations of NPDES permits?
A Yes.
Q Have you or any groups you've represented initiated a citizens suit regarding the assertions in your prefiled testimony about the Port's NPDES permit?

MR. POULIN: Your Honor, I would like to object to this as being beyond both the scope of the direct examination today and to Mr. Wingard's prefiled testimony.

MR. KRAY: If I may respond, Your Honor.

Mr. Wingard's prefiled testimony, as I just illustrated, has numerous allegations of violations of law. I'm merely trying to find out whether he has carried those to the next step and initiated a citizens suit.

MS. COTTINGHAM: I'll overrule the objection.

Q (By Mr. Kray) Do you recall the question?
A If you could restate it, that would be good.
Q Have you or any groups you've represented initiated a citizens suit regarding the assertions in your prefiled testimony about the Port's NPDES permit.
A If you'll give me a quick moment, I'll take a look.

Yes.

Q When was that suit filed?
A 1995, I believe.

Q Is that suit still active?
A No. That suit was settled.
Q Did that suit pertain to the Port's current NPDES permit?
A It would have pertained to the permit in force at the time the suit was filed.
Q So there are currently no suits by you or any group you represent on the basis of the violations you allege in your prefiled testimony, correct?
A No. Well -- yes.
Q With the exception of why we are here today, right?

MR. POULIN: Objection. Confusing.

MR. KRAY: Let me rephrase.

Q With the exception of the present action that we're here on today, there are no suits involving groups that you represent challenging alleged violations of the Port's NPDES permit, is that correct?
A Yes, that's correct.

MR. KRAY: No further questions, Your Honor.

MS. COTTINGHAM: Any redirect?

MR. POULIN: Yes.

EXAMINATION

BY MR. POULIN:

Q Mr. Wingard, was it your testimony that the violations you described are violations of the Port's NPDES permit?

A The violations I describe where?

Q In your prefiled testimony.

A Some of them are.

Q In your line of work, do you draw a distinction -- well, let me bring your attention to the sentence that offended Mr. Kray.

MR. KRAY: Objection. Mischaracterizes.

Q (By Mr. Poulin) The sentence to which Mr. Kray objected, page three, paragraph six, where you state: The construction monitoring reports show repeated violations of the Washington State water quality criteria for turbidity?

A Yes, I do.

Q Are you familiar with the Port's NPDES permit?

A Yes.

Q Does the Port's NPDES permit incorporate these criteria as an effluent limit for construction stormwater discharges?

A Yes. What are you referring to as these criteria?

Q I'm sorry, the criteria for turbidity as found in WAC 173-201A-030?

A It's my understanding that turbidity, the standards for

turbidity, all of the standards would be incorporated into the permit.

MR. POULIN: Okay. I have no further questions.

MR. STOCK: I have none.

MS. COTTINGHAM: Any Board questions?

You're excused.

We'll take a break, mostly for the court reporter and for me. Let's make it a ten minutes break, so let's be back at 25 after.

(Recess).

MS. COTTINGHAM: We'll go back on the record.

MR. STOCK: ACC calls Dr. Kavazanjian.

ED KAVAZANJIAN, having been first duly sworn to tell the truth, the whole truth, and nothing but the truth, testified as follows:

EXAMINATION

BY MR. STOCK:

Q Dr. Kavazanjian, there's a glass of water there.

Could you please introduce yourself to the Board?

A Sure. My name is Ed Kavazanjian. I'm a principal with GeoSyntec Consultants in the Huntington Beach, California office. I'm a registered professional engineer, civil engineer in the state of Washington, among other states,

specializing in geotechnical engineering.

I have a bachelors degree in civil engineering and a masters degree in geotechnical engineering from MIT, Massachusetts Institute of Technology. I have a PhD from University of California at Berkley. I served on the faculty at Stanford University teaching civil engineering, primarily geotechnical and earthquake engineering for seven years. For the last 17 years, I have been a practicing engineer. I'm the lead author of the federal highways guidance document on geotechnical earthquake engineering for highways, and am lead instructor in the National Highway Institute's training course on geotechnical earthquake engineering. And I've designed and analyzed mechanically stabilized earth walls up to 40 feet high.

MS. COTTINGHAM: Could you spell your last name for the court reporter.

THE WITNESS: Sure. K-a-v-a-z-a-n-j-i-a-n.

Q (By Mr. Stock) And do you currently hold a position with respect to Los Angeles' review of earthquake standards?

A Yes, I'm currently chairman of the task force formed by the Los Angeles section, American Society of Civil Engineers Geotechnical Group, to develop guidelines on mechanical stabilized earth walls and slopes for seven jurisdictions within southern California, six county

building departments and the City of Los Angeles Department of Building and Safety.

Q Can you tell us what those seven building jurisdictions are?

A The counties are San Diego, Riverside, San Bernardino, Orange, Los Angeles, and Ventura, and then the City of Los Angeles.

Q You have prefiled testimony this in case, and what I want to do is to spend the next twenty minutes/half hour with you and highlight for the Board various parts of your prefiled testimony.

Just to get started, can you summarize for us the three main points that you've made in your prefiled testimony?

A The three main points in my prefiled testimony were -- first of all, the design is still evolving, it's not complete, there are continuing changes in the design, and that includes the method of construction of the wall, that have resulted in additional undocumented impacts. Until the design is complete and until it's been peer reviewed, we can't possibly know what all of the impacts are of wall construction. The seismic design basis for the wall is inadequate, it's based on a flawed analogy with the Uniform Building Code and on an outdated AASHTO, American Association of State Highway and Transportation

Organization's code, and doesn't properly account for the extended service life or the environmental impacts of a wall failure. And numerical analyses used to evaluate the performance of a wall in an earthquake are unreliable, they're not verified, there's been no verification analysis done of the numerical analysis, and they rely to a large extent on flawed analogy with a very good seismic performance of walls that approach at most one third the height of this wall, so those analogies are not appropriate.

Q Let's get into some specific areas. And I first want to focus on the height of the wall. On page three of your prefiled testimony, you've set out the -- page three of your testimony, you've set out the height of the wall as 135-feet high and topped by a 20-foot high sloped embankment and running for approximately 1500 feet.

Can you explain what you mean, topped by a 20-foot high sloped embankment?

A Certainly. And I think it's 137 feet. But the wall goes up a certain height vertically and the maximum is 135, 137 feet; but then the soil behind the wall continues to rise to a greater height at a slope of two-to-one, two horizontal to one vertical, another 20 feet.

Q Just to give us a visual impact of the height of that wall and the 20-foot embankment on top of it, how many story

building would that equate to?
A Approximately a 15-story building.
Q How does the height of the wall that the Port is proposing to build at SeaTac compare to the height of MSE walls which have experienced seismic shaking?
A It's approximately three times the tallest wall for which we have any experience, for which we have any documentation.
Q Now in your prefiled testimony and just a few minutes ago you referred to an acronym, AASHTO. Can you define for us what that is, what does it stand for and what is it?
A Certainly. The American Association of State Highway and Transportation Organization is a consortium of all of the various state highway departments in the United States that work together to create a code for construction of transportation projects.
Q And how does this wall that's being proposed compare to the height of MSE walls on which the AASHTO code is based?
A The typical walls that are designed according to AASHTO code are on the order of 20 to 30 feet high, 45 feet is probably the maximum height.
Q Is the AASHTO code an appropriate standard for this proposed wall?
A Not for a wall of this unprecedented height in a seismic zone.

Q Why not?
A When you increase the height of the wall, various aspects of the performance will change, the seismic response will change, the load that the soil puts on the facing of the wall and the strips used to reinforce the wall will change, and basically we just don't have any experience of how walls this high will perform in an earthquake.
Q When you say "we don't have any experience," are you the only one of this opinion or are there others with the same type of opinion?
A No, the Federal Highway Administration shares this opinion. I know of a recent project in Pennsylvania where there was a proposed 80-foot high wall designed by the Reinforced Earth Company and it was a proposed design according to the AASHTO code and the in-house RECO criteria, and the Federal Highway informed them that was not adequate, that special studies would be needed for a wall of that height.
Q Okay. I want to slow you down, Dr. Kavazanjian, because you made reference to Reinforced Earth Company and RECO. Why is that important here, who is RECO, Reinforced Earth Company?
A The designer of the wall for the third runway project is the Reinforced Earth Company, the acronym is RECO, R-E-C-O, same thing.

Q And this 80-foot wall that was being proposed, where is that?
A In Pennsylvania, in a non-seismic area.
Q And who rejected the RECO design criteria for the 80-foot wall?
A The Federal Highways regional geotechnical engineer.
Q And is Pennsylvania subject to earthquake?
MR. KRAY: Objection. Asked and answered.
MS. COTTINGHAM: Sustained.
Q Let's talk about FLAC. You refer to FLAC in your prefiled testimony. What is FLAC, what does that stand for and what is it?
A FLAC stands for Fast Lagrangian Analysis - I'm not sure what the C is for - Computer Program.
Q What is it?
A It's a computer program for calculating the response of earth structures to seismic loads.
Q And did the Port consultants use FLAC here to consider or assess the wall's performance under earthquake conditions?
A Yes, they did.
Q And is FLAC an appropriate tool for seismic analysis of this proposed wall?
A It may be, but not in the manner it has been used to date.
Q Why do you say that?
A Well, a numerical program like FLAC has many features and

there are many ways, many different features you can use to model any particular problem. When you create a FLAC model of any particular problem and select a certain group of features to model that program, it's important that you verify the program by using those features to predict the performance of similar structures under similar loads. That way you know that you're getting reliable results, you can then use that to predict the performance of your structure.

Q Are you talking about benchmarking?

A Benchmarking or calibrating. The term was used earlier today with respect to the low-flow calibration verification analysis.

Q Has this calibration or benchmarking been done here?

A Not for mechanical stabilization of earth walls.

Q Are you familiar with the references that the Port has put forth that says that the FLAC for this purpose has been calibrated or benchmarked?

A Yes, I've reviewed those references.

Q And what conclusions do you draw from your review of the references that the Port is relying upon?

MR. REAVIS: I would object. The question is vague as to -- I'm not sure what reference he is talking about.

MS. COTTINGHAM: Sustained.

Q Dr. Kavazanjian, you said you were familiar with the references that the Port is relying upon to make the statement that FLAC has been benchmarked here. Can you tell the Board and Mr. Reavis what you're referring to?

A Yes. Can I look at my documents?

Q Yes, you're free to look.

A I think there may be a reference list in the back of the testimony. I have some of them with me.

In one of the responses to GeoSyntec's comments about the lack of verification of FLAC, the Port cited a number of technical papers on FLAC. These included a paper on "Upper San Fernando Dam 1971 Revisited" by Roth and Davis, a paper by Emil Roth and Makdisi on "Nonlinear Dynamic Effect of Stress Analysis, Two Case Histories," and a paper by Bathurst and Hatami on "Seismic Response Analysis of the Geosynthetic Reinforced Soil Retaining Wall". There may have been one or two other papers cited.

Q And you've reviewed these papers?

A Yes, I have.

Q And based upon that review, what conclusion did you draw with respect to whether these were appropriate references for demonstrating that FLAC had been benchmarked for this wall?

A The only papers that address benchmarking for FLAC were for unreinforced earthen embankments, like the Lower San

Fernando Dam, which was an earth dam that failed in the 1971 San Fernando Earthquake. The only paper on reinforced earth walls, the Bathurst and Hatami paper was a paper study, there was no actual data; in fact, those authors in their paper cautioned that the results of the studies needed to be verified by model tests or actual field data on mechanically stabilized earth walls.

Q Explain for us why that makes a difference here. And I guess I should ask a preliminary question, please.

What sort of reinforcement is the Port proposing to rely upon here for the wall?

A There's several different materials that can be used to reinforce earth, there are fabric sheets, plastic grids, in this case, the system that is being used, which was the first system that was developed, with metal strips. So metal strips are placed - I'm not sure how wide they are - 6 inches, 12 inches wide, every several feet in a horizontal layer and then there's space, two to three feet vertically, as the wall is constructed. So the RECO system, the Reinforced Earth Company system, are metal strips and they are connected to a concrete facing.

Q And the papers that the Port has presented don't relate to or refer to the metal strip reinforcement?

MR. KRAY: Objection. Leading.

MR. STOCK: I'll rephrase it.

Q Do the papers that the Port relies upon --
A The Bathurst and Hatami paper evaluated I believe polymer grids as opposed to metal strips.
Q Okay. Let's talk about the design earthquake. In your prefiled testimony and in your deposition, you've referred to a 10-percent-in-50-year design earthquake. Can you explain what that concept is?
A Certainly. When you specify a design earthquake from the results of a seismic hazard analysis, it's typically specified as two-component criterion, a probability that the earthquake will be exceeded and in an exposure period over which that probability applies. So ten percent in 50 years would mean there's a ten-percent chance that over a 50-year exposure period the ground motions used in the design will be exceeded, there will be an earthquake stronger than that.

The exposure period is typically related to the period of interest with respect to the design. For a commercial building that might be the service life of the building; for environmental projects, it's typically the duration over which the facility has the potential to impact the environment. So, for example, Uniform Building Code for commercial buildings uses a 50-year exposure period, the federal standard for a solid waste landfill uses a 250-year exposure period. That's linked with the

probability -- or the ground motion then over that exposure period is tied to a probability and the probability level is tied to the performance criteria. Some structures, some facilities might have two probability levels, that 50-percent probability level for which the criterion is no damage at all, and then a much lower probability level, two percent, three percent, that the structure would not collapse or release contaminants that were harmful to human health or the environment over the exposure period.

Q The Port has used a 10-percent-in-50-year design earthquake here, is that right?

A That's correct.

Q And is the 10-percent-in-50-year earthquake an appropriate seismic design standard for this wall?

MR. KRAY: Objection. Leading.

MS. COTTINGHAM: Sustained.

Q (By Mr. Stock) What would be an appropriate seismic design standard for this wall?

A I don't think any one person or any one entity should decide what the appropriate period design standard is, I think that's a decision that should be made by all of the stakeholders involved in the project. But certainly a 50-year exposure period is inappropriate for this structure.

Q Do you know of examples of alternative seismic design criteria for similar projects?

A Certainly. The standard that's been used on almost every -- to my knowledge, every federally funded transportation project in the last five years has been a 75-year exposure period and a three percent probability -- well, they have two probability levels, they have 50 percent for no damage and then they have three percent for collapse of the structure. So they use three percent in 75 years.

Q Do you agree with the Port's analysis for the ten percent in 50 years earthquake showing satisfactory performance for the wall?

A No, I don't.

Q What's the basis of your disagreement with that?

A Well, in their analysis of ten percent in 50 years, using FLAC - which for a minute I accept that as being a verified program, and I don't - and they calculate a permanent seismic displacement on the order of four feet at the top of the wall, and they conclude that that's satisfactory performance in the design earthquake. And I'm not convinced, let's put it that way, that that represents satisfactory performance. The typical standard used for earth structures is three feet, and that's for unreinforced structures, and it's not clear to me that

using -- well, three feet, four feet, you could argue that's the same number, it's not clear to me that's appropriate for a reinforced earth structure which would be much more susceptible to permanent deformations than an unreinforced earth mass.

Q What's the implications of this for the facing panels?

A The biggest concern would be that the facing panels would separate from the metal strips due to the loads at the connection. And if that happens, then the wall could loose its integrity; if that happened at the base of the wall, there could be a very catastrophic failure of the wall.

Q Let's switch gears here and talk about the first point you raised, and that is the change in the subgrade improvements. Has there been a change in the proposed subgrade improvements for the wall?

A Yes, based on the documents we've reviewed, sometime in the last year the decision to use stone columns to improve poor soils and create a suitable foundation was changed to excavating the material and replacing it with compacted fill.

Q Did the Port's consultants previously consider excavate and replace?

A Excavate and replace had been considered from the beginning as one of the options, but in their documented

wetlands impact assessment, they stated they would only use excavate and replace if the amount of material that had to be removed was several feet, and for deeper unsuitable deposits they would use stone columns. In response to our questions, they said they were using stone columns to mitigate the impact of the wetlands.

Q What is the impact of the change in the preferred method of subgrade improvements from stone columns to excavate and replace?

A The primary impacts will be associated with the dewatering of the excavation. To remove the unsuitable material, they have to 10, 20, perhaps up to 30 feet of material; to replace compacted fill, they have to dewater that excavation, so they have to lower the water table adjacent to the wetlands, and I've not seen any documentation of the impact of that dewatering on the wetlands.

Q Have the Port's consultants given an estimate of the volume of dewatering expected during the subgrade improvements?

A I've seen some unsubstantiated numbers that seems very low to me. I've seen documents that say that the total flow from the dewatering will be on the order of 20 to 80 gallons per minute, and that seems very, very -- and I haven't see any analysis to back that up, and I think that grossly underestimates the amount of water that will have

to be pumped from the excavation.

For the west wall, my measurements indicate the excavation is about four acres in size. If you have a quarter of an inch of rain in an hour over the four acres, to keep that excavation dry, you will have to pump a thousand gallons per minute. So the 20 to 80 gpm number really doesn't make sense.

Q So to sum up, what is the overall conclusion that you've drawn from your analysis?

A My overall conclusion is that the -- well, I really haven't done a lot of independent analysis. My examination of the analysis that I've been presented by the documentation by the Port and its consultants, I don't find that they're sufficient to provide reasonable insurance that (a), construction will not adversely impact the wetlands to a greater degree than had been previously presented and (b), that the wall will survive an expected seismic event over the life of the structure without adversely impacting the adjacent wetlands.

MR. STOCK: Thank you. That's all I have.

MR. KRAY: I have an objection to the last comment, to the extent the term "reasonable assurance" is construed as a legal conclusion.

MS. COTTINGHAM: Do you wish it be stricken from the record?

MR. KRAY: I do.

MS. COTTINGHAM: I'm going do overrule the objection, the Board will make note of the objection and give it weight.

Mr. Poulin?

MR. POULIN: No questions for CASE, Your Honor.

MR. STOCK: Ms. Cottingham, may I shut the blinds behind the witness? Because of the glare, I just can't --

MS. COTTINGHAM: You may do whatever you like with the blinds.

MR. STOCK: Thank you. That's helpful.

EXAMINATION

BY MR. REAVIS:

Q Dr. Kavazanjian, my name is Gil Reavis. We met about twenty minutes ago.

You've designed and built a lot of MSE walls, is that correct?

A Yes.

Q Any idea how many?

A Half a dozen.

Q Under the right circumstances, that can be a very useful type structure?

A That's correct.

Q Now, with regard to the design standards then, let me first talk about the numeric-type criteria. Do you know what I mean when I refer to numeric criteria?
A Not really. FLAC analysis?
Q Maybe I'm using the wrong term. I'm talking about the ten percent?
A Per year standard.
Q I've also heard that defined as a 475-year earthquake, is that correct?
A That's a colloquial representation of ten percent in 50 years, yes.
Q How do you get to 475?
A That's called the return period, that's the average period of time between events of that strength, so if it's a 475-year return period it would mean that you would expect that earthquake to occur approximately once every 475 years. However, as I say, that's a colloquial representation of the two-part design criteria that's typically specified.
Q Okay. Do you know what the return period is then for the three percent in 75-year standard that you've mentioned?
A Yes. It's approximately 2,375 years, if you want to be relatively precise.
Q So using that, as I understand what you just discussed, you could expect that sort of earthquake to return about

every 2,400 years?
A That's correct.
Q Now the ten percent in 50-years standard is the standard under the current AASHTO code, is that correct?
A It's the minimum standard for typical bridges, yes.
Q And these revisions to the AASHTO code that you've talked about have still not been approved by AASHTO, is that correct?
A That's correct. My understanding is they'll be voted on just in May.
Q You're not sure they'll actually be adopted?
A I have no guarantee.
Q Now the ten percent in 50-years standard is, I think you said, common for commercial and residential structures?
A That's correct.
Q And that includes office buildings?
A That's correct.
Q For example, a high-rise office building could be designed to the ten percent in 50-years standard?
A Within certain limits, yes.
Q Do you know what the standard is for a high-rise office building in downtown Seattle?
A I'm not familiar with the Seattle building code.
Q I think you described in your prefiled testimony this three percent in 75-years standard as being a standard for

what are called life-line structures?

A I believe I referred to life-line structures in my testimony about three percent in 75 years. The difference between the life-line and ordinary structure would not be the three percent in 75 years, it would be the performance under that load. So in a life-line structure under the three percent in 75-years earthquake you would design it to have no damage and be serviceable; with a typical bridge with the three percent in 75 years, you would design it not to collapse. So the design standard is the same, but the performance standard changes with importance of the structure.

Q What sort of structure would you describe as a life-line structure?

A Bridges, pipelines, airports are considered life-line structures because they're essential to the response and recovery of the region after the earthquake.

Q Hospitals, I assume?

A Hospitals.

Q You mentioned performance standards. Is that oftentimes a more narrative criteria?

A I'm not sure what you mean by a narrative criteria. The performance standards, for instance in the AASHTO code, the performance standards are clearly specified in the code; there's a narrative that accompanies that code that

goes into further detail, but the performance standards of whether you design it to not collapse or to remain serviceable after the earthquake or not be damaged at all, that's part of the code, that's not a narrative.

Q I guess I'm trying to distinguish between something that has numbers affixed to it and something that describes the design so it's not going to not collapse.

MR. STOCK: There's no question.

Q (By Mr. Reavis) Can you explain for me if the performance standards are actually, as you describe them, words that say it's not going to collapse as opposed to a numeric standard?

A Actually, once you design a bridge not to collapse, you do a numerical analysis that's called a pushover analysis to determine what loads and what conditions will cause that bridge to collapse, so you do have to assign a numerical value to that collapse standard.

Q Have you seen Mr. Bailey's prefiled testimony here?

A Yes, I have.

Q Have you reviewed the performance standards set forth in that testimony?

A Yes, I have.

Q So one of those is that the MSE walls and bank of fill will remain stable during and after the basis of design criteria?

A I believe that's correct.

MR. STOCK: Objection.

Q Is that the type of thing you're talking about when you describe performance standards?

A That would be the type of thing I think that you describe as a narrative standard. The performance standard would then be the conclusion -- well, I guess one of my criticisms all along is there has been no quantitative performance standard, they have simply said we don't want it to collapse. Then, instead of saying what would constitute collapse, what amount of deformation would be available, and then doing the analysis to see if they have that much deformation, they run the analysis, they get a certain amount of deformation and then they say: Oh, that's looks okay. So there was never any attempt made to rationally quantify what the acceptable deformation would be without the wall collapsing.

Q Do you believe the Port hasn't done that analysis?

A I've not seen any indication it's been done.

Q Let me ask you just a couple of questions about the FLAC program, and maybe if you could give us a general understanding of what that does?

A In a computer program like FLAC, you build a numerical model of the earth structure, you basically make a grid - let's call it a tic-tac-toe - you make a geometrical

representation of what you're going to model, so you draw the wall and you draw the subgrade in. And then you break that up into a bunch of little elements and to each of those elements you assign a property: Sand, glass, concrete, metal strips, and you put all of that into the computer program which then computes the response of that geometric structure to some input earthquake motion, it's a numerical computation.

Q And that is the program the Port did last year?

A That is what FLAC does. There are many programs that do that.

Q You've never personally used the FLAC yourself?

A That's not true.

Q You have?

A We're using it right now.

Q You, yourself?

A Well, the engineers who work for me.

Q Let's talk a little bit about the concept of failure with regard to a wall of this type. Now, a conclusion that the wall fails doesn't necessarily mean that the wall falls down, is that correct?

A Elements of the wall can fail without a total collapse of the wall.

Q So one definition of failure would be that the wall deforms somewhat, and that could be considered wall

failure?

A In some circumstances it could be, in other circumstances it could be considered acceptable performance. It's important to define that when you develop your seismic criteria.

Q But as applied to this particular wall, the conclusion could be reached that the wall has failed, and yet it doesn't mean that the soil is spilling out into the neighboring wetland?

A I'm not sure what you mean by the conclusion could be reached; somebody could certainly come to that conclusion, yes.

Q I guess trying to establish that the concept of failure in this context doesn't necessarily mean that the soil is going to come spilling out of the MSE wall?

MR. STOCK: Object. Vague.

MS. COTTINGHAM: Restate the question.

Q (Mr. Reavis) Does the concept of failure necessarily mean that the dirt behind the wall is going to come spilling out?

A I don't want to get into semantics, but you need to define -- if you're going to talk about failure, you need to define what you mean by failure. In some cases we talk about acceptable deformation, so the wall could certainly deform from its pre-earthquake state in a manner that is

considered acceptable, that's not considered failure.
Q Now is it true that you haven't done any analysis of the Port's design to calculate what level of earthquake would cause a global failure of the wall?
A That's true.
Q You don't know particularly whether a one-foot or a four-foot deformation or some other similar deformation would cause the embankment to lose any soil?
A I don't think anybody knows the answer to that.
Q Are you familiar with the group of people who are called the Embankment Technical Review Board?
A Yes.
Q Have you seen documents produced by that group?
A I've seen one summary report, and I don't know it was produced by them; I've seen a summary report produced by the facilitator for that group, Peter Douglas, that purported to summarize what their conclusions were.
Q Do you know if that group was conducting a peer review of the Port's consultant's design of this structure?
A My understanding was they were serving in a review capacity; to the extent they conducted their reviews, what questions they were asked to answer, I don't know.
Q Let me ask you about some of the individuals in that group. Do you know Dr. James Mitchell?
A He was my dissertation advisor.

Q So you would accept him an expert in soil and ground behavior?
A Certainly.
Q How about Dr. I.M. Idriss?
A Yes.
Q Do you know him?
A I do know him.
Q Do you also acknowledge that he is an expert in the earthquake engineering field?
A In seismic response, yes.
Q Do you know Dr. Barry Christopher?
A I do know Dr. Christopher.
Q How do you know him?
A We worked on a large super fund project, the operating industries super fund site, where we were analyzing the performance of a reinforced earth wall. He was on the EPA's technical review board.
Q What is his area of specialty, if you know?
A Geosynthetics.
Q Now, let's talk a little bit about this method of constructing the embankment that involves excavating some of the problematic soils and replacing them. Is that something that you're familiar with?
A Yes.
Q That's a good idea from a stability standpoint, is it not?

A I would agree with that, yes.
Q Your comments, as I understand them, relate to the hydrologic impacts of that technique?
A That's correct.
Q But you haven't done any studies to quantify what those impacts might be?
A Nothing other than my back-of-the-elbow calculation on direct precipitation.
Q And that's what you described earlier?
A Gpm, yes.
Q You haven't done studies on contaminant fate and transport potential caused by that sort of technique?
A No, I have not.
Q Do you know if the RECO is the largest builder of MSE walls in the world?
A I don't know that for a fact.
Q A couple of other big MSE walls referred to in your prefiled testimony, one of them being in South Africa, is that correct?
A Those, I'm basically citing the information that was provided to us by the Port's consultants, two walls of similar height, one in South Africa and one in Hong Kong.
Q Do you know anything about the South African wall?
A Little, except for the fact that it's never been subjected to significant seismic loading.

Q What about the Hong Kong wall?
A Again, little except that it's a RECO wall and it also has never been subjected to significant seismic loads.
Q I guess that's my question. Do you know what seismic loads either of those structures has been subjected to?
A My understanding is that neither of them has been subjected to any kind of significant earthquake shaking, what we would consider to be strong ground motions would be something that would generate at least one-tenth the acceleration of gravity, which would be still one third of what the ten percent in 50 years earthquake is.

MR. REAVIS: I think that's all I have. Thank you.

MS. COTTINGHAM: Mr. Kray.

MR. KRAY: No questions.

MS. COTTINGHAM: Redirect.

MR. KRAY: A few redirect.

EXAMINATION

BY MR. STOCK:

Q Dr. Kavazanjian, by any chance, do you know what design earthquake has been used for building the new viaduct in downtown Seattle?
A My understanding is that the design earthquake for new construction for the Alaskan Way Viaduct would be three

percent in 75 years.

Q And with respect to Mr. Reavis' questions on wall deformation, if the wall deformed four feet, what would you expect to happen?

A Well, that's not a simple question to answer, because if it was a gradual deformation and if the wall just tilted and if it was graduate from zero at the base to four feet at the top, you might conclude that that's acceptable performance. You might. On the other hand, if, you know, a segment in one of the piers of the wall shifts four feet, that's clearly unacceptable performance.

Q What would be your expectation with respect to the wall panels?

A Certainly, with that magnitude of deformation, the panels would separate from the strips and there would be a significant soil loss. The panels are at most six inches wide, so if it moves four feet you would have a gap where there would be significant soil loss and slumping, at a minimum.

MR. STOCK: That's all I have.

MS. COTTINGHAM: I have a couple of questions for you.

When you said the ten-percent chance over 50 years, what word would you associate with the ten percent? Collapse, failure, slump, damage?

THE WITNESS: It's probability that an earthquake motion greater than the design motion will occur.

MS. COTTINGHAM: So it has nothing to do with what happens, it's the earthquake probability?

THE WITNESS: That's correct.

MS. COTTINGHAM: The second question is, can you assign a magnitude to the earthquake? We're used to 6.8's around here.

THE WITNESS: That's my understanding. My understanding is that's a representative -- one of the issues in a probabilistic seismic hazard analysis is there's no single magnitude, actually, that acceleration comes from a whole family of earthquakes, large magnitude earthquakes very far away, small magnitude earthquakes very close, but the average magnitude assigned to that design earthquake is about 6.7, and I think it represents the Seattle Fault earthquake.

MS. COTTINGHAM: Do you happen to know, you used the three percent in 75 years for the life-line structures and then you used the example of the Alaskan Way. Do you happen to know what the standard is for things like earthen dams, maybe even concrete dams?

THE WITNESS: The standard for dams depends on the hazard. A high-hazard dam is defined as a dam, the

failure of which would kill six or more people, and I'm not sure where the six comes from, but that's the government definition of a high-hazard dam. It's an earthquake that I guess I'll have to use return period, it has a return period of about 10,000 years, so it's approximately a one percent in a hundred years for a high-hazard dam, and that standard decreases as the hazard goes down.

MS. COTTINGHAM: Thank you. Any other Board questions?

MR. LYNCH: I have one.

Thank you for your testimony today. I know you were expressing some concerns about the wetland soils being replaced with densely compacted soils, but I wanted to ask you a question about the densely compacted soils. When you were expressing concerns regarding the performance of these tall MSE walls, were you taking into account that they would be placed on this densely compacted soil?

THE WITNESS: Yes. Let me go back a ways. When we made our first comments on the wall when stone columns were proposed, we questioned whether they were appropriate for the foundation. As pointed out by Mr. Reavis, from a performance point of view, if they hadn't replaced the stone columns with densely compacted fill, that would be an additional concern of mine in terms of performance of

the wall; but in my current performance assessment, it does consider the fact that densely compacted soils will replace those unsuitable soils.

MR. LYNCH: Thank you.

MS. COTTINGHAM: Any questions as a result of Board questions?

ALL COUNSEL: No, Your Honor.

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

MR. STOCK: ACC will call its next witness, Dr. John Strand.

Mr. Witek will be asking questions of Dr. Strand.

(Pause in proceedings).

MS. COTTINGHAM: Okay. Start the clock again and we'll go back on the record.

JOHN STRAND, having been first duly sworn or affirmed to tell the truth, the whole truth, and nothing but the truth, testified as follows:

EXAMINATION

BY MR. WITEK.

Q Dr. Strand, can you introduce yourself to the Board and spell your last name, please?

A I'm John Strand. Spelling is S-t-r-a-n-d. And I'm from Richland, Washington. I'm a fisheries biologist, I'm

employed as a consultant, although I work under contract with the Airport Communities Coalition.

Q Dr. Strand, is your CV attached to your prefiled testimony?

A Yes, it is.

Q Can you summarize for us your qualifications and your areas of expertise?

A I'm a certified fisheries biologist by the American Fisheries Society and a Fellow in the American Institution of Fisheries Research Biologists. My academic training includes a bachelors degree in biology from Lafayette College, master of science degree from Lehigh University in biology, and a final degree, my doctorate in fisheries biology from the University of Washington.

The focus of my studies at the University of Washington and over some 27 years of employment are to design and conduct studies to better understand the chemical fate, transport and biological effects on aquatic ecosystems, with a focus on fish. I've had 21 years of experience with Pacific Northwest Laboratories in Richland and in Sequim, Washington, for the Department of Energy, it's a national laboratory operated by Battelle Memorial Institute. Then I worked several years in Alaska on the oil spill for the National Marine Fishery Service, a couple of years consulting with Engineering Science and

Technology in Redmond, Washington, and three years with the Department of Natural Resources in King County, where I helped conduct an ecological risk assessment on the Duwamish River. Since 1999 I've been self employed. I also teach part time, I hold two adjunct faculty appointments at Washington State University TriCities in the biology department, the biological sciences program and also environmental sciences and regional planning program. I teach classes in environmental health assessment, in immunology, aquatic ecology and the restoration of fish communities. I also teach occasionally at Columbia Basin Community College in Pasco, Washington, I teach environmental sciences to undergraduates there.

Q Dr. Strand, can you describe for us the project area streams? And, if you need to, refer to this oversize board.

A If I may refer to the map that is shown to you here. I've been working in two principal watersheds since I started with the ACC in early 2000. The Miller Creek drainage essentially lays to the north and to the west of the airfield, it empties out through this drainage here in Normandy Park. It includes the Walker branch, which drains an area from this wetland that's west of the airport, and that all in my opinion constitutes the Miller

Creek watershed.

And then I've worked in the Des Moines Creek watershed, which essentially -- one branch anyway, flows out of Bow Lake and comes down the east side of the airport, south of the airport, through Des Moines Park and outfalls at Des Moines Beach Park in the city of Des Moines.

There is a west branch that flows through the Port's property into the Northwest Ponds and then it joins with the east branch of Des Moines Creek at just a little above South 200th before then continuing its run to Des Moines Beach Park.

Q Dr. Strand, are there fish in the project area streams?

A Yes, there are. Of note, there is a resident population of cutthroat trout that exploits all these waters generally, at least the up to -- I have found them all of the way up to the buyout area south of the boundary that the Port maintains at this point in time, in Miller Creek. I've found them in Walker branch as well, and up to South 200th of Des Moines Creek. They're a very abundant, valued trout species, that's the native cutthroat.

Then both of the drainages, the Miller Creek and Des Moines Creek, are exploited by two pieces of salmon that we know of, both the chum salmon and the silver salmon or coho salmon. Generally, the adults return in the fall and

spawn in the lower reaches of both of these drainages. Chum, probably the lowest down, and they occur in both drainages, and then as their larvae hatch out of the gravel they generally leave right away and go to sea. But the coho, after their spawn, the young hatch and then spend another year in the creeks before they outmigrate to the sea. And generally those areas where I've found cutthroat trout, I've seen the coho salmon rearing over that year before they outmigrate to sea.

There are some warm water species that are likely result of introductions in Lake Reba, Lora Lake, possibly even Northwest Ponds. They're incidentals, but they are in the streams as well. The other native species I see is the sculpin, a small bottom fish that is there.

So there is a valued salmonid population that hangs on despite the disturbance there, and clearly the trout species, the cutthroat there is in great abundance, it seems fairly hardy and under these conditions it does pretty well.

Q Thank you, Dr. Strand. I will ask you some questions to get you to summarize some of the major points in your prefiled testimony, and I'll start with storm water. And if you need to refer to any exhibits you should let me know.

What's the significance of the volumes of storm water

being discharged to the project area streams?

A Well, if I could refer to I believe it's Exhibit 6, it's the Port's most recent stormwater annual report, the Port's data recorded in 2000 and 2001. There's a couple of tables in the back of that report that might be useful to look at, let's see if I can get the exact page for you.

Well, there are two tables that I want to talk about briefly, they're on pages 66 and 67. I think these are illustrative of the volumes of storm water that are discharged from the Port's outfalls. On page 67, you'll find the table that provides some estimated runoff volumes in gallons for storm events that were monitored in July 2000 to June 30th 2001. And on the left-hand side of your table are some storm dates, these are twenty-some times that the Port has run their model and calculated the runoff volumes of these storms that they are required to monitor per their NPDES permit.

And what I'm getting to is, if we look at some of the estimated runoff volumes, they are fairly significant. I think you would agree with me. But let's look another SDS 3, which is 005 outfall. If you were to run a quick total on those estimated runoff volumes, I think we were pretty close to 40 million gallons that are discharged through that one outfall. That's a lot of water and that does not include estimates of runoff for storms that were not

monitored coming from that outfall.

Now if you turn the page, page 66, there are some estimated peak runoff rates in gallons per minute for the storm events that were monitored, for which you just observed some of the total release volumes. And if we look at the SDS 3 again, it's one of the large outfalls that discharges to Des Moines Creek, we see estimated peak runoff rates of 15, 16,000 gallons per minute. Now if one does a quick conversion to cubic feet per second and we know something about the flows in the stream from previous testimony, in the summer, for example, sort of a worst case, these streams flow at about 1 CFS, that low, and that's about 500 gallons per minute.

Then, keeping that in mind, look at the peak runoff rates for SDS 3 in this value of 15 or 16,000 gallons per minute, we're looking at like 35 CFS that's coming out of there. Now that's not for a long period of time generally, but the point is I'm saying there's a significant amount of storm water that is discharged by the Port's outfalls that can mean trouble for the indigenous biology for the streams.

Q Dr. Strand, can you tell us what's in the storm water?

A Yes. It starts with rain and runoff onto impervious surfaces, for example, streets, roads, parking lots, taxiways, runways are all examples of impervious surfaces,

sidewalks as well as buildings, that sort of thing. Between storms they develop a loading of particulate materials, it can come from automobile tires, brake shoes, it can come from dust and the like. All of this then, when it rains, can be entrained into what we refer to as storm water.

Out here at the airfield, the storm water contains some metals, particularly zinc and lead and copper, I mentioned the sediment material, particulate matter. Also, this translates to turbidity issues that we want to talk about a little bit later, but it also could include in this particular case, in the winter, glycols, which are used to de-ice and prevent icing on aircraft, and there's some other materials that are placed on the runway as well -- I'm not going to talk about them today, but clearly as part of storm water you'll see fecal coliform bacteria there in the storm water that discharges from these outfalls that we are talking about. That was sort of a thumbnail sketch of what is found in storm water.

Q Dr. Strand, what's the significance of the presence of metals in storm water discharging in the project area streams?

A We might look at another exhibit for this. I would like to ask you to go to Exhibit 426. That's the 1997 stormwater manual, and I think you've seen some of this

data earlier today, but I would like to ask you to turn to page 35 in this report, as I remember. Page 35 and it's Table 19. This was discussed to some degree earlier today.

The significance of metals. Part of what I can talk about with regard to significance relates to whether or not the metals are exceeding numerical criteria that are contained in WAC 173-201-040, which deals with toxic substances. I'll talk about turbidity later, but we're going to talk about metals now. I would like to call your attention to Table 19. This presents some data -- we're combining data here, but I think it's still illustrative of a couple of points I would like to make about whether or not it's my opinion that there are exceedances of these numerical criteria. This includes data for copper, lead, nickel and zinc, both from a total recoverable perspective, as well as a dissolved metal perspective, and it also provide a hardness relationship as well.

But as we look at that data for metals, you look at the upstream levels and they are generally lower than what we see downstream, they are certainly a lot lower than what is coming out of the Port's outfall or outfalls, in this case, this is what's being discharged to Lake Reba. The downstream values are higher than the upstream values, they're not as high as what's in the outfall. And I would

like to interpret this information as indicating a contribution of the outfall to what's still seen or persistent at some point downstream, in other words, that there's a contribution by the Port's outfall.

Now there's some uncertainty associated with this, yes, because there are other sources of the storm water that enter this water body, Lake Reba. But I think it's difficult to otherwise reconcile the very high values for copper and zinc that are in the outfall, and I don't think you can say that there isn't an influence of these metals that are shown downstream. The exceedances still exist downstream. And knowing something a bit more about zinc adds credence to this interpretation. We know that SDN 1 is one of the outfalls that discharges into this water body. I think there are two other discharges as well, but SDN 1 is the discharge that has been showing toxicity on the whole effluent toxicity testing that the Port is required to conduct periodically, it's part of the conditions of their NPDES permit. There is a significant number of failures of that bioassay in data not only from this 1997 report, but we find evidence of that toxicity in the '98, '99 and 2000, 2001 reports. Of recent import is some of the source tracing information that the Port developed and found that the chemical of concern that can account for this toxicity is zinc, and they traced it back

to some galvanized roofing on some of the buildings that are found in that stormwater basin that contributes to the outfall known as SDN 1.

As an aside, the WET testing from time to time has also showed toxicity at at least two other outfalls, not just here but ones that discharge to Des Moines Creek, SDE 4 has from time to time shown toxicity in whole effluent testing. The other outfall that discharges here in Lake Reba has shown toxicity, SDN 4.

The other point I would like to make is that because of the upstream exceedances of copper and zinc, downstream exceedances and exceedances that we see in the outfall suggests that this outfall is making a bad problem worse, which in my opinion is a violation of 173-201-070 --

MR. KRAY: Objection.

MS. COTTINGHAM: Would you read back his response?

(Reporter read from the record).

MS. COTTINGHAM: Much like the earlier ruling I made on Mr. Kray's motion, I'll overrule the motion but we will note it for the record and the Board will give it the appropriate weight.

MR. KRAY: Thank you, Your Honor.

Q (Mr. Reavis) Go ahead, Mr. Strand.

A One final point I would like to make with respect to Table

19, and it indicates that the Port, in 1997, or when they worked with '95-96 data, which this is, did make an effort to sample above and below their discharges as well as to determine what's in their discharges, which I think is in general terms an appropriate approach to try to address whether or not their discharge is having harm on the receiving body, I think that's in general a good way to go. Although I think maybe one of the things I might have done was to maybe try to model this and get some handle on the available dilution that you have below discharge so to better put in perspective just what concentrations of chemicals are in the stream. But this is the last time you'll see this approach in the data that they collect. Their sampling approach has changed, they no longer develop a picture like this, what's above or what's coming from the discharge, what may be below the discharge in the stream. And I think that's a real weakness of their sampling protocol presently, I think it detracts from the confidence anyone would have in that they are meeting their compliance requirements based upon the WAC.

Q Dr. Strand, is there evidence that metals are accumulating in the project area streams?

MR. KRAY: Objection. Leading.

MS. COTTINGHAM: Sustained.

Q (By Mr. Witek) Dr. Strand, are you aware of any evidence

as to whether metals are accumulating in the project area streams?

MR. KRAY: Objection. Leading.

MS. COTTINGHAM: Sustained.

Q (By Mr. Witek) Dr. Strand, are there metals in the project area streams?

MR. KRAY: Objection. Leading.

MS. COTTINGHAM: Why don't you lay a foundation.

Q (By Mr. Witek) Dr. Strand, are you aware of documentation addressing metals in project area streams?

A Yes. Metals, as well as other contaminants will end up in stream sediments, if there is -- if these are deposition areas where there's less current, where maybe the particulates they are associated with end up. And the Port has collected some of this data, they include in this same exhibit, 426 - that's on Table 4, it's on page 14 - some sediment data that I think is of interest here. If you would turn to that table.

MS. COTTINGHAM: What number table is it?

THE WITNESS: Table 4 in the 1997 report, the table is entitled Miller Creek Sediment Quality Data Summary, milligrams per kilogram dry weight, I think it amounts to page 14 in that 1997 document.

And in looking at this information, it says to me that metals are accumulating in sediments and, in this

case, downstream from Lake Reba. But that is of concern to me. There isn't as much metal associated with upstream from Lake Reba, but there may be some physical chemical reasons why, but clearly the levels of chemicals, of metals in particular, downstream of Lake Reba, suggest to me that there is this sort of depository of metals there. And why that may be important is that they are there and, dependent upon conditions in the stream, freshets, floods, washouts, changes in the chemistry of the water, these metals may be mobilized and moved downgradient, downstream. And we in the state of Washington do not have sediment quality standards or sediment management standards for freshwater. We do for marine waters.

But I took the liberty of comparing these values to some Canadian standards for freshwater - these are Ontario standards - they are mentioned in here, although the suggestion is that they shouldn't be compared to, they should be referred to. I don't agree with that. If you want to try to put into perspective what these concentrations may be, I feel that the standards that were developed up in Canada embrace the concept that we use for our own marine standards, something called the apparent effects threshold, that these are an appropriate way to go, at least to see if you have a problem, a screening tool. When I did that and compared it to the Canadian

standards, there were some exceedances of the Canadian standards for copper and for zinc and I believe lead, as well, suggesting that they are already at levels at least in this area that may be harmful to invertebrates and other organisms that can be found associated with sediments.

Q Dr. Strand, in your prefiled testimony you discussed bioaccumulation. Would you summarize for us what your prefiled testimony said about that?

A I was concerned with whether or not metals that are found in the streams, either in the water column or the sediments, were available to invertebrates and fish that live in the stream, in other words, were the metals that we see in the stream, were they being accumulated by the animals that live there, the trout -- and I did look at trout, I couldn't look at salmon, there's no way you can kill a salmon to look at its metals screen. But I did collect trout in both Miller Creek and in Des Moines Creek, just below the Port's boundaries; I had no access to the Port's properties to collect fish in the reaches of the streams that pass through their property, but I could for example in Des Moines Creek go right up to the South 200th Street crossing of Des Moines Creek, that's just below the Tyee Golf Course where Des Moines Creek outfalls. And I did seine up some trout in that immediate

reach below South 200th Street, and I then had them delivered to an analytical laboratory that extracted the total metals from those fish.

I did a similar collection in Miller Creek. I did this two times in the year 2000, both in the wet season and in the dry season, to see whether there was a difference relatable to the amount of storm water being added to the streams. The data that was derived from the analytical laboratory I then compared to some threshold values that were developed by a scientific colleague, his name is Sheppard. These are really what we refer to as tissue screening concentrations, and they relate to the amount of accumulated -- in this case metal in a fish, and whether or not you can correlate a bioeffect, in other words, cause and effect, you see the buildup of the metal in the animal and at what time and what level does it cause toxicity. He has been putting - his name Sheppard - putting together a database of threshold values, toxicity or -- excuse me, tissue screening values. And the Army Corps of Engineers has adopted this database, it's available on the web site that they have at the Vicksberg experiment station in Mississippi, for example. These are tissue screening concentrations that are used to make some sense out of uptake of metals and other materials associated with their drinking operation, it's from

materials that are in dissolution and suspension.

Anyway, I did these comparisons and, when I did that, I found that for lead and zinc the tissue screening concentration or the thresholds that Sheppard derived that's being used now by Army Corps were exceeded. What this tells me, it's not anything absolute, but the use of that information - again, I'll emphasize screening - tells me that we have a problem; it doesn't tell me much about the magnitude of the problem, but it does prompt a question or beg another question about getting at the real risks associated with these animals that are exposed to metals in the system and that are accumulating metals in the system. Clearly the Port contributes a lot of metals to this system.

Q Dr. Strand, have you observed turbidity in the project area streams?

A Yes. On site visit January 28th, this is a site visit to the Port, I had occasion to -- I was toured about the airport site by the Port's hosts, and one of the stops on the tour was the outfall of the SDS 1. It outfalls to Des Moines Creek just about here on this bend. It's at the south side of the tank farm. I believe there's a picture somewhere that was an exhibit, a picture I snapped of the outfall of SDS 1 to Des Moines Creek at this location.

Q Dr. Strand, is that Exhibit C, to your prefiled testimony?

A Yes, it is. It should be here. Okay.

MR. WITEK: I have extra copies of the photograph here, if any one else wants one.

A (Continuing) The picture that is prefiled Exhibit C, I believe shows the contribution of SDS 1 here. The outfall is on the right-hand side of the picture and it's demarked by the white milky color to the stream, you can see it actually extends down into the stream and it mixes with the stream. I had an occasion to bring with me on this date a Hellig turbidimeter, this was a sensor that will measure the amount of suspended material in the water. It does in terms of nephelometric turbidity units, which is relatable to the standard in the WAC 201 water quality criteria.

MS. COTTINGHAM: Would you mind spelling both of those words you just used for the court reporter.

T-u-r-b-i-d-i-m-e-t-e-r. N-e-p-h-e-l-o, nephelometric.

MS. COTTINGHAM: Thank you.

A (Continuing) What I did with the turbidimeter was to take some samples, I took duplicate samples in the stream above where the outfall enters the stream, and then I took the two additional samples just below where the discharge of SDS 1 enters the stream. There was some mixing occurring, not a lot. I didn't go but a couple of meters below -- well, it was just about at the juncture of that boom

that's there, that's the snake-like object that's there to catch floatables and the like.

When I did those measurements, I determined that the ambient, that is, the upstream turbidity level was around 29 or 30 nephelometric turbidity units, NTU's. When I took the samples out of where SDS 1 was mixing with Des Moines Creek, I found a tenfold increase in the NTU, that is where I think the duplicate readings were 299, 300, something like that. There is I think an exhibit that Dr. Willing referred to this morning, e-mailed to me, he was collecting data that day and he made the results of that and I was busy with the meter, but that will document the turbidity readings. That's about it.

Q Okay. Dr. Strand, just to sum up on storm water, what impact would construction of a third runway have on stormwater discharges to the project area streams?

MR. PEARCE: I object on the lack of foundation. There's testimony that he talked a lot about the existing impacts but not a lot about the new project that's proposed.

MS. COTTINGHAM: Would you lay a foundation.

Q (By Mr. Witek) Dr. Strand, are you aware of the Port's third runway proposal?

A Yes, I am.

Q Can you generally describe its features?

A Among other things they will -- I think it's germane to this issue, they will increase the quantity of impervious surfaces that would be available for runoff to occur.

Q What would be the result?

A Increased volume of storm water to creeks and, presumably, unless we do something about the quality of the storm water, it would be that much more in the way of chemical burdens to reconcile entry to the creeks.

Q Dr. Strand, I want to move on to another topic.

Can you summarize for us the concerns you expressed in your prefiled testimony regarding the fill that's been imported to the third runway site?

A There's I think a series of exhibits that should be part and parcel to my prefiled. But to make a long story short, I indicated through these exhibits that it's my opinion that there are chemicals that exist in the existing stockpile of fill material that would be used for the third runway. I've cited three examples where the documentation indicates that the Port has accepted contaminated fill. One of these is the Hamm Creek sediments, soils, they're really sediments, their origin I believe was the Duwamish River, they were dredged from the Duwamish River. They came, actually 80,000 cubic yards were accepted by the Port and moved to the stockpile at the airfield and the Army Corps characterized the

sediments. There's also some data that the Port has used that was collected by Boeing -- they are not as recent. The soils characterization, the sediment characterization that the Corps did was I believe '97, and I think you have to go back to 1990 for the Boeing report.

The characterization provided by our Army Corps, Seattle District, said that there were chemical contaminants in these materials, quote: DDT and PCBs. DDT is a pesticide, and PCBs are polychlorinated biphenyls, they're dioxins, an infamous PCB, but they're hazardous chemicals, and levels for 14 and 160 parts per billion respectively. This was based on four samples taken by the Corps, they were composited down to two. All of this for 80,000 cubic yards.

The Boeing study that went back to 1990 was done for an entirely different purpose. It was done as part of a property transfer, it was a site assessment, and there was some sampling but did not detect any chemical contaminant such as PCBs or the pesticides. I think there were eight or ten samples that were taken, as I remember, certainly more so than what the Corps took.

The problem here is there were different methods used, different locations used, the results were very different and I would think that that would have prompted another round of samples to try to reconcile this, but

that wasn't the case. Really on the bases of finding nothing in the Boeing samples and the four limited samples that the Corps did, the Port accepted those materials and they're now stockpiled at the airfield.

Q Dr. Strand, are there two other sites that you are concerned about?

A There are two other sites, one is the First Avenue Bridge, First Avenue South Bridge. Soils that were 85,000 cubic yards were moved to the Port. To make a long story short, there the issue was finding petroleum hydrocarbons in the samples, some of which exceeded at that time the MTCA, a cleanup standard that was being applied to fill criteria that were being evolved by the Port and under the cognizance and review of Ecology.

Q Dr. Strand, can you tell us about the third site and what that constituent was?

A That was a Black River Quarry site. And again this is an issue of petroleum hydrocarbons that come from asphalt materials that found their way into the rock-crushing machines that were used to process the soils that came from that site and were transferred to the Port's stockpile. And at this time we were seeing a change in the standard that was applied, the MTCA standard, it was going up by a factor of ten, from 200 to 2000 parts per billion, with respect to a particular fraction of

petroleum hydrocarbons, I think it was diesel and heavy oils. But clearly there was, at the time, the standard was still back down at the 200, that is, the time that this candidate soil or fill was being evaluated for transfer, it was transferred -- some, maybe not all of it. But the point here is that, in my opinion, there are soils that are stockpiled that contain some chemicals and some of these chemicals are problematic to me.

Q Thank you, Dr. Strand.

I noticed in paragraph 39, you discuss sampling. Can you summarize your concerns there?

A Yes. I think -- and I sort of emphasized this when I described the Corps of Engineers efforts to characterize the Hamm Creek sediments, there were only four samples composited down to two for 80,000 cubic yards, there was the additional -- I shouldn't say the additional Boeing samples, the Port used the ten-year-old Boeing samples as additional sampling. The point I'm getting at is that in my opinion, the number of samples that were taken here to characterize the candidate fill material is far too low to reasonably assure you that you haven't missed some chemicals in the soil. You know, 2, 4, 10, 14, 16 total, 14 total samples that characterized the 80,000 cubic yards in my opinion isn't statistically rigorous.

There clearly are techniques available that are

applied to hazardous waste sites. The state Ecology's Peter Kmet was suggesting these himself, he was suggesting a much greater sampling effort to help characterize the potential for chemical contaminants in candidate soils. So I'm saying it doesn't meet with my understanding of statistical requirements to provide much assurance that these materials that we're stockpiling there are free of chemicals.

MR. KRAY: Ms. Cottingham, I believe we've reached 5 o'clock. Would this be a good time to wrap up?

MS. COTTINGHAM: Let's me ask how many questions you have, and we'll break at the end of direct, unless it's going to go on.

MR. WITEK: I think it's five to ten minutes.

MS. COTTINGHAM: Continue.

Q (By Mr. Witek) I wanted to move on to one last topic.

A I wanted to add one thing. I guess why I bring that up, why I have included that in my prefiled testimony, is that knowing that there are chemicals in the soils that could be used, that are stockpiled there, that could find their way into the final mix of fill for the embankment, raises my concern that there might be -- I think there is a potential that some of these chemicals will be mobilized in the soil column. There is a potential in my view that some of these materials could move out of the fill column

and gain entry to groundwater which may be connected to surface waters.

(Pause in proceedings).

A (Continuing) I was just saying it's just a concern of mine that that could happen. From work that I've done elsewhere, I have seen contaminants in soils migrate through soil, gain entry into groundwater, and move into surface water. So that just raised a red flag for me that that should be addressed.

MR. WITEK: Ms. Cottingham, we still haven't actually got to the questions I had left at 5 o'clock, so I'm thinking it might actually work better if we just end now and I think we can wrap up very quickly tomorrow morning.

MS. COTTINGHAM: I think that is a good suggestion. This is a break in your line of thinking at this point?

MR. WITEK: That's correct.

MS. COTTINGHAM: Okay. Why don't we do that. We'll stay on the record for a second.

How much time has elapsed?

MR. POULIN: On the Appellants' clock, 2 hours 35 minutes and 13 seconds, and on Respondents' clock, 1 hour 49 minutes and six seconds.

MS. COTTINGHAM: Okay. Is this your last

witness for ACC, not counting rebuttal witnesses?

MR. STOCK: Yes, in terms of witnesses we are calling, then obviously we will have examination of Ecology's and the Port's witnesses. But the next step will be to move to Ecology witnesses.

MS. COTTINGHAM: Mr. Kray is this order, Fitzpatrick, O'Brien, Garland, Yee, Wang, Walter, the order you plan to go?

MR. KRAY: I believe it is. We had previously had Kelley Whiting on there, it looks like he's come off and been rescheduled. I think that's because his schedule didn't permit him to arrive before Monday, so I do anticipate that at some point tomorrow, when ACC has completed the examination of Dr. Strand, we will begin with Kevin Fitzpatrick.

MS. COTTINGHAM: Do you think this will fill up all of tomorrow, or we won't need anyone else on deck?

MR. KRAY: I can certainly let you know who we anticipate going on to after Ms. Walter. And we will address that this evening and get those people here to fill up the day.

MS. COTTINGHAM: We need to know the names on the list so that we can all be prepared.

MR. KRAY: And I can do that, I'll do that right now.

MS. COTTINGHAM: Even if you don't call them tomorrow, if they are on deck, we should know about that.

MR. KRAY: I anticipate that tomorrow we will be able to complete Mr. Fitzpatrick, Mr. O'Brien, Mr. Garland, Mr. Yee. Now I'm anticipating that we won't have more than an hour or so of Dr. Strand. On deck then I would have Mr. Wang, Ms. Walter, and that's probably a full day right there. Does that sound right?

And I'll make Mr. Stockdale available as well. I wouldn't suggest that anybody try to prepare beyond Mr. Stockdale.

MS. COTTINGHAM: It also might be a nice day to have a little bit of an afternoon. So if it looks like around 4 o'clock it's time to change to a longer witness, we may call that a day. It just depends how we all feel.

MR. REAVIS: Could I make just one procedural suggestion and that is, with regard to motions like we had today, it would be nice and I have no idea what the Board's calendar is like and don't know if this is workable, but to the extent possible if we could consider those types of motions outside of the hours of 9:30 to 5:00. I'm afraid we might not run out of chronos chess clock but we might run out of days if we eat up more of our days with motions.

MS. COTTINGHAM: I'm going to recommend that at

the end of Friday to have the discussion Monday morning on assessment of where we are in terms of time. So I can say you've gone through 50 percent of your time and 50 percent of your witnesses, but I have no idea whether or not the 50 percent remaining will consume 75 percent of the available time.

(Laughter).

MS. COTTINGHAM: So with that, just be prepared that after the conclusion of tomorrow that each of the parties needs to do an assessment of where we are.

And with that, unless there's anything else, we'll go off the record and be back at 9:30 tomorrow morning.

(Evening recess 5:10 PM)

# C E R T I F I C A T E

STATE OF WASHINGTON )

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COUNTY OF THURSTON )

Betty J. Koharski, Notary Public in and for the State of Washington, residing at Olympia, does hereby certify:

That the annexed and foregoing Transcript of Proceedings, pages 4-0001 thru 4-0204, was reported by me and reduced to typewriting by means of computer-aided transcription;

That said transcript is a full, true and correct transcript of my shorthand notes of proceedings heard Before the Pollution Control Hearings Board on March 21, 2002 at Lacey, Washington;

That I am not a relative or employee of counsel or either of the parties therein or otherwise interested in said proceedings.

WITNESS MY HAND AND OFFICIAL SEAL this 23rd day of April, 2002.

Notary Public, in and for the State of Washington, residing at Olympia. My commission expires September 17, 2003. Washington CSR No. KOHARBJ619BN