Commission of Inquiry into the Decline of Sockeye Salmon in the Fraser River

Commission d'enquête sur le déclin des populations de saumon rouge du fleuve Fraser

Public Hearings

Audience publique

Commissioner

L'Honorable juge /
The Honourable Justice
Bruce Cohen

Commissaire

Held at:

Room 801
Federal Courthouse
701 West Georgia Street
Vancouver, B.C.

Monday, June 13, 2011

Tenue à :

Salle 801
Cour fédérale
701, rue West Georgia
Vancouver (C.-B.)

le lundi 13 juin 2011

Errata for the Transcript of Hearings on June 13, 2011

Page	Line	Error	Correction
37	1	tree	three
49	17	done	down
50	23	Mr. Grace speaking	Mr. Hill speaking
51	2	where	there
57	31	effluent rate	effluent reg
65	41	Mr. Gill	Mr. Hill
67	12	In that period if should be 10.	In that period it should be 10.
79	22	merging	emerging
93	30	provincial BMS system	provincial EMS system
throughout transcripts		Environment Management Act	Environmental Management Act

Suite 2800, PO Box 11530, 650 West Georgia Street, Vancouver, BC V6B 4N7
Tel: 604 658 3600 Toll-free Tel: 1 877 658 2808
Fax: 604 658 3644 Toll-free Fax: 1 877 658 2809
www.cohencommission.ca

APPEARANCES / COMPARUTIONS

Wendy Baker, Q.C. Micah Carmody	Associate Commission Counsel Counsel
Tim Timberg Hugh MacAulay	Government of Canada ("CAN")
Boris Tyzuk, Q.C. Elizabeth Rowbotham	Province of British Columbia ("BCPROV")
No appearance	Pacific Salmon Commission ("PSC")
No appearance	B.C. Public Service Alliance of Canada Union of Environment Workers B.C. ("BCPSAC")
No appearance	Rio Tinto Alcan Inc. ("RTAI")
No appearance	B.C. Salmon Farmers Association ("BCSFA")
No appearance	Seafood Producers Association of B.C. ("SPABC")
No appearance	Aquaculture Coalition: Alexandra Morton; Raincoast Research Society; Pacific Coast Wild Salmon Society ("AQUA")
Tim Leadem, Q.C.	Conservation Coalition: Coastal Alliance for Aquaculture Reform Fraser Riverkeeper Society; Georgia Strait Alliance; Raincoast Conservation Foundation; Watershed Watch Salmon Society; Mr. Otto Langer; David Suzuki Foundation ("CONSERV")
No appearance	Area D Salmon Gillnet Association; Area B Harvest Committee (Seine) ("GILLFSC")

APPEARANCES / COMPARUTIONS, cont'd.

No appearance	Southern Area E Gillnetters Assn. B.C. Fisheries Survival Coalition ("SGAHC")
No appearance	West Coast Trollers Area G Association; United Fishermen and Allied Workers' Union ("TWCTUFA")
No appearance	B.C. Wildlife Federation; B.C. Federation of Drift Fishers ("WFFDF")
No appearance	Maa-nulth Treaty Society; Tsawwassen First Nation; Musqueam First Nation ("MTM")
No appearance	Western Central Coast Salish First Nations: Cowichan Tribes and Chemainus First Nation Hwlitsum First Nation and Penelakut Tribe Te'mexw Treaty Association ("WCCSFN")
Anja Brown Kennedy Bear Robe, Articled Student	First Nations Coalition: First Nations Fisheries Council; Aboriginal Caucus of the Fraser River; Aboriginal Fisheries Secretariat; Fraser Valley Aboriginal Fisheries Society; Northern Shuswap Tribal Council; Chehalis Indian Band; Secwepemc Fisheries Commission of the Shuswap Nation Tribal Council; Upper Fraser Fisheries Conservation Alliance; Other Douglas Treaty First Nations who applied together (the Snuneymuxw, Tsartlip and Tsawout); Adams Lake Indian Band; Carrier Sekani Tribal Council; Council of Haida Nation ("FNC")
No appearance	Métis Nation British Columbia ("MNBC")

APPEARANCES / COMPARUTIONS, cont'd.

No appearance	Sto:lo Tribal Council Cheam Indian Band ("STCCIB")
No appearance	Laich-kwil-tach Treaty Society Chief Harold Sewid, Aboriginal Aquaculture Association ("LJHAH")
No appearance	Musgamagw Tsawataineuk Tribal Council ("MTTC")
No appearance	Heiltsuk Tribal Council ("HTC")

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Vancouver, B.C./Vancouver
(C.-B.)
June 13, 2011/le 13 juin 2011

THE REGISTRAR: The hearing is now resumed.
MS. BAKER: Thank you, Mr. Commissioner. Today we're dealing with effluents from pulp and paper operations and mines, metal mines in the province. We have four witnesses here from B.C. and Canada: Mr. Doug Hill and Mr. Bob Grace, Ms. Janice Boyd and Mr. Mike Hagen, and perhaps we can start with having these witnesses sworn.
THE REGISTRAR: Good morning. Can you just turn your microphones on, please. Thank you.

DOUGLAS HILL, affirmed.

ROBERT GRACE, affirmed.

JANICE BOYD, affirmed.

MICHAEL HAGEN, affirmed.

THE REGISTRAR: Would you state your name, please.
MR. HILL: Douglas Hill.
THE REGISTRAR: Could you speak up and into the mike.
MR. HILL: Sorry. Douglas Hill.
THE REGISTRAR: Thank you.
MR. GRACE: Robert Grace.
MS. BOYD: Janice Boyd.
THE REGISTRAR: Thank you.
MR. HAGEN: Michael Hagen.
THE REGISTRAR: Thank you. Counsel.
MS. BAKER: Thank you. Mr. Commissioner, I'd like to start by marking the Policy and Practice Report that was prepared for this section of the hearings. It includes Pulp, Paper, Mining and also Municipal Wastewater, which will be dealt with on Tuesday and Wednesday. So this report was dated May 24, 2011 and I'd like that marked, please, as the next policy and practice report.
THE REGISTRAR: That will be PPR number 15.
MS. BAKER: Thank you.

PPR15: Policy and Practice Report, Municipal Wastewater, Pulp and Paper and Mining Effluents, May 24, 2011

EXAMINATION IN CHIEF BY MS. BAKER:

Q I'll start with you, Mr. Hagen. Could you have put Mr. Hagen's *c.v.* up, please, it's at Tab 1. Thank you. Is that your *c.c.*, Mr. Hagen? It should be on the screen in front of you.

MR. HAGEN: Okay.

Q That's your *c.v.*?

MR. HAGEN: That is my *c.v.*, yes.

MS. BAKER: Okay, thank you. I'll have that marked, please.

THE REGISTRAR: Exhibit number 1021.

EXHIBIT 1021: *Curriculum vitae* of Michael Hagen

MS. BAKER:

Q Thank you. And I'll just review a couple of points from it. From 1992 to the present you've been with Environment Canada in the Natural Resources Sector; is that right?

MR. HAGEN: Yes, that's correct.

Q Okay. And you began working with the ***Pulp and Paper Mills Regulations*** in 1996, right through to 2002?

MR. HAGEN: That is correct, yes.

Q Okay. And you have then transferred into responsibility for mines in the province in 2002 and would have been the Regional Coordinator under -- for EEM under the mines regulations since then?

MR. HAGEN: Yes, that is correct. I could clarify one point, though. In 1992 the EEM Regional Coordinator was Alan Colodey, and in about 1996 Al became Section Head and at that time I became the EEM Regional Coordinator. I was assisting Al prior to that.

Q Thank you.

MR. HAGEN: Janice also became a coordinator at that time.

Q Thank you. I'll move next to Ms. Boyd. And your *c.v.* is in Tab 34. Is this your *c.v.*?

MS. BOYD: Yes.

MS. BAKER: I'll have this marked, please.

THE REGISTRAR: Exhibit number 1022.

EXHIBIT 1022: *Curriculum vitae* of Janice Boyd

MS. BAKER:
Q And you have been with the Environment Canada since quite a ways back, but I'll just focus on your time working with the pulp regulations. Since 1996 you've been involved in administering the pulp regulations; is that right?
MS. BOYD: That's correct.
Q And as --
MS. BOYD: Sorry, the Environmental Effects Monitoring part of the pulp mill regulations.
Q Thank you. You're the EEM Coordinator, or you've been an EEM Coordinator since what time?
MS. BOYD: It was about '96/'97 there was a transition.
Q Okay. And you've been doing it ever since?
MS. BOYD: Yes.
Q Okay, thank you. And your work is restricted, then, to pulp and paper, and Mr. Hagen looks after mines, that's the separation?
MS. BOYD: That's correct.
Q All right. Thank you. I'll next move to Mr. Grace, and your *c.v.* is at Tab 35; is that right?
MR. GRACE: Yes, that's my *c.v.*
MS. BAKER: Thank you. Can I have that marked, please.
THE REGISTRAR: Exhibit number 1023.

EXHIBIT 1023: *Curriculum vitae* of Robert Grace

MS. BAKER:
Q And you're in the Environmental Protection of the Ministry of the Environment, unless it's changed in the last couple of weeks.
MR. GRACE: No, we stayed the same.
Q Okay, good. And you started your career with the province as a Waste Management Technician for Pollution Prevention in 1976?
MR. GRACE: That's correct.
Q And in 1984 you became an Environmental Impact Assessment Biologist for the Division in Kamloops?
MR. GRACE: Yes.
Q And you've been there since 1984 doing that work?
MR. GRACE: I did have a few short stints as Acting EQ Section Head.
Q Okay. And part of your work as an Environmental Impact Assessment Biologist is to conduct and supervise water quality and biological and physical monitoring for the Division in the

Thompson-Nicola area?
MR. GRACE: That's correct, and also in the Fraser area, basically from Boston Bar, not including Boston Bar, up to about Watson Creek.
Q And in that work you look at impacts from both pulp and paper mills and mines; is that right?
MR. GRACE: That's correct, and anything else that we deal with.
Q Okay, thank you. And then lastly Mr. Hill. Mr. Hill's *c.v.* is at Tab 2. Is that your *c.v.*?
MR. HILL: Yes, it is.
MS. BAKER: Could I have that marked, please.
THE REGISTRAR: Exhibit number 1024.

EXHIBIT 1024: *Curriculum vitae* of Douglas Hill

MS. BAKER: Thank you.
Q And you have an Engineering degree from UBC, Mr. Hill?
MR. HILL: Yes.
Q And you've been the Head of the Environmental Management Section at the Province in Williams Lake since 2002?
MR. HILL: Yes, for the Cariboo Region.
Q And prior to that from 1998 to 2002 you were a Senior Environmental Protection Officer in that region?
MR. HILL: Yes.
Q Okay. And you are responsible for provincial environmental management activities in the region, in that role; is that right?
MR. HILL: Yes.
Q And in your prior work, and perhaps today, you are also involved in negotiating terms and conditions of permits?
MR. HILL: Yes.
Q And that would include -- and your work includes both pulp mills and mining, mining activities?
MR. HILL: Yes. We deal with two pulp mills in Quesnel and three operating mines in the region.
Q Thank you. My questions will start with questions for Environment Canada. In these hearings we've learned about the ***Fisheries Act*** and s. 36 of the ***Fisheries Act***, and I just wanted to identify that there's two regulations under that, under s. 36 of the ***Act*** which are of interest for today's hearing.

The first one is the ***Pulp and Paper Effluent Regulations*** and the second is the ***Metal Mine Effluent Regulations***. I could direct that to you, Mr. Hagen?

MR. HAGEN: Yes, that is correct.

Q Thank you. And the ***Pulp and Paper Effluent Regulations*** came in first; is that right?

MR. HAGEN: The ***PPER*** were promulgated in 1992.

Q Which is prior to the mines regulation?

MR. HAGEN: And the ***MMER*** came into effect in 2002.

Q Okay. Ms. Boyd, I want to talk to you about pulp to start, and I've got a couple of corrections to make in the PPR on this front. So my first question to you is how many mills are there on the Fraser system?

MS. BOYD: There are seven mills.

Q Okay. And in our PPR we've got the wrong number in there, so I just want to take you to that. If you can turn to page 67, paragraph 182 identifies that there's ten --

MS. BOYD: Oh, this one.

Q It should be on the screen in front of you.

MS. BOYD: Oh, okay.

Q Thank you. That's fine. So paragraph 182 identifies ten. So that should be seven?

MS. BOYD: That should be seven, correct.

Q Okay.

MS. BOYD: There's two in Prince George, two in Quesnel, there's two in near Vancouver and the Lower Mainland instead of five.

Q Okay. And the one near Kamloops.

MS. BOYD: That's correct.

Q Okay. And in the -- if we go to the footnote for that paragraph, footnote 355, just to confirm. So Northwood Pulp Mill and Prince George Pulp and Paper Mills-Canfor Ltd., those are correct?

MS. BOYD: That's correct.

Q And those are the ones near Prince George. And the next two that are near Quesnel are Quesnel River Pulp and also Cariboo Pulp and Paper Company?

MS. BOYD: Mm-hmm.

Q Is that right?

MS. BOYD: That's correct. I guess I was just going to correct --

Q Mm-hmm.

MS. BOYD: -- just make a comment on the Prince George

and -- Prince George mills are two mills side-by-side in one pipe, so we count them as one.

Q The Northwood and Prince George?

MS. BOYD: No, the Prince George pulp mills, there's two, Prince George and Intercon.

Q Oh. I see. So Prince George Pulp and Paper Mills-Canfor Pulp Limited Partnership, that's two mills with one effluent discharge?

MS. BOYD: Sorry, Canfor, it's Canfor Prince George Intercon Pulp Mills. They sometimes just collectively call them Prince George Mills.

Q Okay.

MS. BOYD: Sorry, for the (indiscernible - overlapping speakers).

Q That's fine. We want to be clear, so thank you. Then we just looked at Cariboo, so the next one is Cellulose Fibres-Domtar Pulp and Paper, that is the one near Kamloops, that's correct?

MS. BOYD: That's correct. The name is actually shorter now, just Domtar Products Inc. will be sufficient.

Q Okay.

MS. BOYD: A recent name change.

Q Okay. And then we have written down here:

...five mills operate near Vancouver.

Well, I'll just go through those. You've already said there's two. So I'll just make that correction. And there's Norampac Burnaby-Cascades Canada, that's correct?

MS. BOYD: Yes, that's correct.

Q And then the next one, Buckeye Canada, is that wrong?

MS. BOYD: Buckeye can come out. That's not a pulp mill under the regs.

Q Okay. And the Kruger Products, we have indicated that -- first of all, Kruger is one of the ones near Vancouver?

MS. BOYD: That's correct.

Q And we have indicated that it has three locations; is that wrong?

MS. BOYD: It just has one pulp mill location.

Q Okay.

MS. BOYD: The others might be a furnish source, like trees.

Q Okay, thank you. And then paragraph 183 of the

PPR identifies mills on the shores of the Strait of Georgia and other marine areas. And I understand that Gold River is not correct, that should be taken out?

MS. BOYD: Yes. It was -- it was closed by 1998.

Q Okay. And then also Squamish and Elk Falls closed. I understand Squamish is correct in closing in 2006.

MS. BOYD: That's correct.

Q But Elk Falls actually closed in February '09; is that right?

MS. BOYD: That's correct.

Q Okay, thank you.

MS. BOYD: But announced permanent closure in 2010.

Q Okay. Now, the mills that are identified in paragraph 182 as we've corrected it, are those mills all subject to the ***PPER***?

MS. BOYD: Yes.

Q And this question could go to either Ms. Boyd or Mr. Hagen. In 1992 when the new regulations came in, this is the ***PPER*** that we're talking about, what were the significant changes from the previous regulations or scheme which governed pulp effluent in the province, or in the country?

MS. BOYD: I was just going to take it for the pulp and paper.

Q Okay.

MS. BOYD: The significant regulation that before that regulation came in, there was less than ten percent of the mills that were covered under the regulation. And so this mill brought in all the mills that discharged to an aquatic receiving environment came under the regs, so essentially all the mills across Canada.

It also significantly reduced the effluent loads from that -- from the mill effluents in terms of measuring suspended solids and measuring biochemical oxygen demand, which is a relative measure of the oxygen demand that that effluent has on the system to break down.

It also required what is called a non-acutely lethal effluent. It's a bioassay test, and that meant that in doing rainbow trout in -- rainbow trout fry in a 100 percent effluent, ten of them are put in a tank and they have to live for those four days, at least five of them live is what the pass is, but generally all of them live these

days, after the regulations. Hopefully that's clear.

Q Were there changes to regulation of dioxins and furans?

MS. BOYD: There were two regulations that came in at the same time that the 1992 ***Pulp and Paper Effluent Regulations*** came in. And those basically curtailed the release of dioxins and furans into the receiving environment. The other addition I forgot to note for the pulp and paper was the requirement of an environmental effects monitoring program to verify that these load limits were adequate, and it's the first time in a regulation that they have this verification in a national reg.

Q Okay. And can I summarize the monitoring components of the regulation as including identification of the -- well, it prescribes the biochemical oxygen demand limits, it prescribes the limits of suspended solids, and also addresses acutely lethal effluent. There's that first component, correct?

MS. BOYD: Correct.

Q And then the next component is the requirement for environmental effects monitoring, as you've just described, and as we'll get into in some detail.

MS. BOYD: Yes, that's correct.

Q Okay.

MS. BOYD: There are other monitoring -- there are other parameters in monitoring, monitor that those were the -- the core parameters that you noted were what have limits.

Q And you are the Environmental Effects management, or Monitoring, excuse me, Coordinator, and what is contained in that role, like, what do you do in that role?

MS. BOYD: I advise the mills as required so that they can meet the regulations of the Environmental Effects Monitoring Program. I review all of their submissions as required under the regulation and make sure that they come in as required and contain what's required. I provide that data to the national office so that they can wrap up the data into a national analysis so that we can work towards determining if the regulations are adequate, or whether we still see effects in the receiving environment.

Q Do you ever attend at the mills to review compliance?
MS. BOYD: Not for -- well, yes, the short answer is yes. We do go out in the field to a select number of mills to verify that they are undertaking the program as prescribed in their design. I was also thinking if I do attend the mills with Enforcement who are looking at compliance from the effluent discharge perspective.
Q Okay.
MS. BOYD: But they are lead in that.
Q And now this may not be an environmental effects monitoring role, but are you also involved in assessing applications for effluent discharge authorizations?
MS. BOYD: I will prepare them, but there is a designated Authorization Officer who would sign those. But if I would receive the applications and make a recommendation on what to authorize.
Q And your region is all of B.C.; is that right?
MS. BOYD: That's correct. I guess it's B.C. and Yukon, but we only have mills in B.C.
Q Okay. And do you have any staff that assist you in these responsibilities?
MS. BOYD: No.
Q All right. Just for reference, not to make corrections this time, but for reference, if we can turn to paragraph 167 of the PPR, which is on page 61. We've summarized here the basic parts of the regulation as I just identified with you orally, and I just wanted to note that:

> The [regulation] prescribes certain deleterious substances in pulp and paper mill effluent...

And those are -- that's under s. 3 of the regulation; is that right?
MS. BOYD: Yes, that's correct.
Q And it includes --
MS. BOYD: (Indiscernible - overlapping speakers), yes.
Q -- acutely lethal effluent, so that's considered a deleterious substance?
MS. BOYD: That's correct. So failing a 96-hour LC50 test with rainbow trout.
Q Okay. And the BOD matter, and that's the biochemical oxygen demand. Can you explain what

that is and how is that a deleterious substance?
MS. BOYD: Well, it's -- what it defines in the regulations is a limit at which they impose on mills. So below that they don't consider that a deleterious substance; above that is. But it's essentially the organic matter that is -- it's a measure of the demand of oxygen in the receiver for that to break that down. So the higher that is, the more that you're taking from the oxygen in the system itself.
Q Okay. And then the last thing that's just prescribed as a deleterious substance are suspended solids?
MS. BOYD: Yeah, that's -- it's again, well, solid and/or organic matter that again will have -- there's in some cases, it can cause a smothering, and in some cases it has chemicals that are attached to it that also bring contaminants into the receiving environment.
Q Okay. And then page or paragraph 168 on the next page of the PPR, just as a summary of the regulation, describes the deleterious substances that I've just reviewed with you, it prohibits the discharge of acutely lethal effluent. It sets out limits for BOD and TSS, which is total suspended solids; is that right?
MS. BOYD: That's correct.
Q And these quantities are determined by a formula that's set out in the regulation, as well as some other conditions. So it's not simply a this amount per millilitre, it's a formula that's created?
MS. BOYD: It's a formula, so it's almost like a per ton of product. So there's a formula that's defined in the regulation. Each year the load limits are set based on what's called the reference production rate, and the reference production rate is the highest 90th percentile in the last three years.
Q Okay. And that regime sets out the authorized discharges under the regulation, and anything other than outside of those authorized limits is considered, or could be considered an offence?
MS. BOYD: Yes.
Q Okay.
MS. BOYD: Unless they have an authorization that -- there's ability to also have an authorization that

may be different from s. 14, which is the standard that most mills use.

Q All right. Can a more stringent monitoring of these deleterious substances be required of a mill?

MS. BOYD: Yes, there is capacity within the ***Pulp and Paper Effluent Regulations*** to have special -- I don't know if it's still called "special regulation", but within that, like, for example, in the pulp and paper regs right now we have Part 2, which applies to one mill. So there's special -- there's special limits for that particular mill.

Q Is that the only mill where there's been a special number set?

MS. BOYD: Yes.

Q Is that the Port Alberni mill?

MS. BOYD: That's correct.

Q Okay. And how often are the -- I take it, sorry, that each mill needs to monitor in accordance with the regulation these discharges, and I'm not even sure how to describe them, but these parameters?

MS. BOYD: That's correct. It's defined in Schedule 2 in the reg when.

Q and how often are the results of that monitoring reported to Environment Canada?

MS. BOYD: They're reported monthly, and they're required to be reported within 30 days of the end of a given month.

Q And how often do they actually have to do the monitoring?

MS. BOYD: It depends on the parameter. Suspended solids is daily; flow is daily; biochemical oxygen demand is three times per week; the acutely lethal effluent is tested once per month, and the Daphnia magna toxicity test is once per week. Sorry, and then there's pH and conductivity which are also measured daily, and flow, if I didn't say that one already.

Q You did. Thanks.

MS. BOYD: And production, sorry.

Q In Tab 4 of the Commission's documents is a summary which outlines a system for reporting which is called the Regulatory Information Submissions System. It should be at Tab 4 of the Commission documents. All right. And this, can you explain what this system is, just in a general

overview sense?
MS. BOYD: It's an electronic database that mills can enter their ***Pulp and Paper Effluent Regulations*** data into. This, for pulp and paper it doesn't include the environmental effects monitoring data, only the effluent data.
Q So the information that we have just been describing is entered into this electronic system.
MS. BOYD: That's correct.
MS. BAKER: Could I have this marked, please, as the next exhibit.
MS. BOYD: Exhibit number 1025.

EXHIBIT 1025: Regulatory Information Submission System (RISS) Overview

MS. BAKER:
Q And this RISS system is also used under the mining regulation; is that right?
MS. BOYD: That's correct.
Q And does this system, is it used to assess compliance with the deposit limits under the different regulations?
MS. BOYD: Primarily the inspectors and enforcement will be using it for -- they will monitor the compliance in there. I may look at the data sometimes if I see something, because if I'm using the data so I have access to it, as well. But they are the primary users to monitor compliance for their mills.
Q Okay. So this is the tool that's used to enforce compliance essentially, or the initial stage of enforcing it.
MS. BOYD: I think, yes, I was going to say the inspectors going on site have to enforce compliance, but definitely it's a tool that helps them.
Q Okay. And has that electronic system improved compliance, do you know?
MS. BOYD: That would be an enforcement question, but to qualify it would -- it puts information at their fingertips better, because it will come in and then once it's into the system, then they can -- the inspectors can look at it right away and there are queries that allow them to pull up specific violations. They'll say, you know, you can ask if a given mill has exceeded limits, or it

will pull up that information. It's designed so that it makes it easier for the inspector to see if a violation occurs.

Q And are the results of that system or is the system itself provided to the province to assist in doing its work?

MS. BOYD: The short answer is the province would get the same data, and actually more, because usually they're more in the permits, but I don't believe they have access, per se.

Q So the province gets the raw data, but they don't get access to the electronic system that the data is stored in; is that correct?

MS. BOYD: Theirs would be an electronic system also, the province's.

Q But there's not a sharing of -- this kind of monitoring data is not a shared database between the province and Canada?

MS. BOYD: I don't believe it is right now, but there is, I think that they're looking into options for that, particularly as we extend the RISS system. Like it started in Ontario and then it came to B.C. and the Atlantic provinces. Quebec has a different but similar system because there's a provincial agreement and there are a couple of provincial agreements for Alberta and Saskatchewan. So there may be looking into an option that could allow that, that sharing, but we do get the same data already and both electronically.

Q Do you get the data that's collected by -- with reference to the provincial limits, which may be different from the Canadian limits? Does all that information come to you, as well?

MS. BOYD: We have copies of all the permits, so we know what the limits are.

Q And does the monitoring data that's done in relation to the provincial permits get forwarded to Environment Canada, or do you just receive the results that are required under the pulp regulation?

MS. BOYD: That would be an enforcement question, but I know that we -- they do receive -- they have received monitoring data in the past. I'm just not sure in what form it comes to them any more. It used to come in hardcopy.

Q All right. I'm going to move to environmental

effects monitoring now. What does the -- you touched a little bit on this in your introductory answers, but can you just explain what the purpose of EEM is?

MS. BOYD: The fundamental is to use science and verify in the receiving environment that the load limits that we put on the 1992 regulations were adequate to protect all receiving environments for fish, fish habitat, and use the fish resources. It was -- like before we focused on end-of-pipe measures to just measure when loadings dropped, but this was an actual verification in the receiver that those limits worked. So we're now working through the process of evaluating the data that we've collected for pulp and paper, and we're further along in pulp and paper than we are for metal mining, so we're coming up with our sixth cycle of data. So we're about at the stage where we can make that determination. But the fundamental is then you can judge whether there needs to be regulatory changes, although we have actually evolved the program so that we get more information and working towards fixing effects that have been observed already.

Q Okay. And who does the monitoring?

MS. BOYD: The mills or the facilities for the mines and the mills do the monitoring.

Q And you had said earlier that at times your officer, you will go out to check that it's being done correctly. Is that the EEM monitoring that you will verify?

MS. BOYD: That's correct. Yeah.

Q And I understand that the components of EEM are biological monitoring studies which include a fish survey, and also a benthic invertebrate community study, so those two components; is that right?

MS. BOYD: Yes. And also fish survey, and it's prescribed in the regulation which they need to do. Like, they may not need to do a fish survey, for example, if they're not a chlorinated bleaching mill and they don't meet the trigger conditions. They don't require it. Similarly for fish and benthic invertebrates for pulp and paper, there are measurements. If your one percent effluent, for example, is less than 250 metres from the outfall you don't require a fish survey. If it's less than 100 metres from the outfall, you

don't require a benthic survey. These didn't come in from the start. They evolved in the program. So after Cycle 1, we introduced the fish survey exemption. For one reason it wasn't practical to measure fish in that short distance because they're moving around, and (2) it seemed unlikely that there would be effects in that short distance. And there were also some safety concerns with just trying to measure the fish in that -- in that small area.

Q Okay. But from a conceptual point, there's a fish survey --

MS. BOYD: Yes.

Q -- and there's a benthic survey, those are both biological studies that are done as part of EEM with --

MS. BOYD: That's right.

Q -- adjustments made as you've described.

MS. BOYD: That's right. And a fish tissue survey, if it's triggered.

Q And then also there's sublethal toxicity tests, as well?

MS. BOYD: That's correct.

Q Okay.

MS. BOYD: I mean I guess I would just add that there are, once you look at that data, that may take you, if you see effects, to other phases in the biological monitoring where you would find effects and you go into the phase of investigating those effects and investigating solutions.

Q Sure. Well, let me take you through it kind of piece-by-piece, and then maybe we can go through that in some detail. So first looking at the fish survey, what -- that's first of all, as you described, that's intended to assess effects on fish themselves, right?

MS. BOYD: Yes.

Q And how is that -- how is that assessment done? How is the assessment of effects done?

MS. BOYD: The mill or the mill's consultant, they look at the common resident species, the ones that would be exposed to effluent, and they target -- they target two. And sometimes two species, abundant species aren't possible, so there may only be one. But they find a fish species that's basically living in the receiving environment in the exposure area, and they measure core

parameters in the fish and exposure in reference area and compare if there's a statistical difference between the two.

Q Okay. And a reference area being an area that doesn't have a pulp mill associated with it, but has the same fish?

MS. BOYD: Yeah. Hopefully it's like upstream, you try and do an upstream/downstream, or there may be conditions if, like, for example, an invertebrate species is used for a fish, as defined under the ***Fisheries Act***, it may be a gradient design. So you're at the furthest, you go from a higher exposure area to a lower no exposure.

Q Okay. And then the benthic survey, how is that -- that's done to assess effects on fish habitat as opposed to fish?

MS. BOYD: Yes. It's benthic invertebrates or what the fish may feed on. So the same idea of comparing in a reference and exposure area, and there's core parameters that are measured and compared to determine if there's a statistical difference, and high statistical gradient.

Q How often are the fish and benthic survey data submitted to Environment Canada?

MS. BOYD: It's either every three years or every six years, but initially they're on a three-year cycle and they do the comparisons and evaluate the effects parameters. If there is no effects in two consecutive cycles, then they get -- they reduce their monitoring to every six years.

Q Okay.

MS. BOYD: But if they have effects, then they maintain that for years to move forward into investigation of cause.

Q Okay. And what about sublethal toxicity tests? What is that?

MS. BOYD: Sublethal toxicity tests include invertebrate and plant species now. They originally included fish, but what we found over four cycles of data that from the improvements that the mills made in their effluents we weren't getting a response out of the fish anymore, so it wasn't a valuable parameter to use any longer. So that was dropped. It was a recommendation that was put forward in the Smart Regulations Report which was looking at the effectiveness of the program in 2005.

Q And how often are the sublethal toxicity tests conducted -- or how often are they conducted and how often are the results communicated to Environment Canada?

MS. BOYD: They're conducted twice a year and they're reported within three months of completing the test. Although there is a condition for once per year if they're not depositing effluent less than 120 days of the year.

Q Now, there's a study design, is that right, that's prepared for each mill to set up the study for EEM or environmental effects monitoring?

MS. BOYD: Not necessarily -- well, each mill is required to prepare one, but they may do it jointly, such as in the Upper Fraser mills, the Prince George and Quesnel mills do a joint study, so they prepare their document together, but it's all -- it's all in one, but they need the requirements for individual mills.

Q And who designs this study, is it -- is Environment Canada involved in designing the study?

MS. BOYD: Well, the regulations lay out the requirements and we also have technical guidance, but the mill and the mill's consultants prepare the document.

Q Do you review it once it's...?

MS. BOYD: Yes, we review it, and we're often involved in an earlier stage just in consultation or we have what's called local -- a local monitoring committee. So we usually meet to discuss a previous result to discuss the proposed design before they submit a final design, just to look at, make sure that they meet the requirements and that they're on the right track.

Q And who participates in the local monitoring committee?

MS. BOYD: It depends on a particular mill and where the interest is, but fundamentally it includes Environment Canada, and it used to include Fisheries and Oceans, but the core governments, Environment Canada and B.C. Ministry of Environment, for example, and on a local monitoring committee with Bob for the Kamloops mill. And then it can also include ENGOs, environmental groups or First Nations, depending on the interest at a given mill.

Q Okay. The RISS system that we looked at earlier, the electronic database, does that database reflect the EEM data coming from the mills?
MS. BOYD: It's not for -- RISS doesn't include EEM data for pulp mills, but it does include some EEM data for metal mines.
Q Okay.
MS. BOYD: Which Mike can clarify.
Q Yes. We'll talk about mining, I think, once we get through pulp.
MS. BOYD: Yes.
Q There's a lot of things to keep priorities right here.
MS. BOYD: Yeah, yeah. Yeah, I'm sorry.
Q That's okay. Is there a compliance element to the EEM monitoring, for example, would Enforcement ever be involved in the EEM monitoring program?
MS. BOYD: Well, they could be. We would refer any problems to them, but we haven't had problems to refer to them at this stage.
Q And what, would they be problems with exceeding limits or would they be problems with failing to report data, or failing to use appropriate methods, or what?
MS. BOYD: It would be either failing to report the data or using appropriate methods, because the limits are within the non-EEM part of the regulation.
Q Okay. Now, as you said, this regulation has been in longer than mining, and there's been some national assessments of the data which I want to review with you. After the first three cycles there was a national assessment done and that is in Tab 15.
MS. BOYD: Yes. Well, I don't have it on the screen, but I have it in front of me.
Q Okay. Tab 15.
MS. BOYD: Oh, I have it on the screen.
Q All right. Okay. And so what were the first three cycles -- this was looking at the three cycles all across the country, if I understand it correctly.
MS. BOYD: That's correct.
Q And what was the -- what was being looked at in those first three cycles? What was the expectation?
MS. BOYD: I guess I should clarify. This wraps three

cycles together, but we actually do a review after every cycle, both of the data and how the program was working so that we could -- like, for example, after Cycle 1, which is the first time this had been done in a national reg, so there were a lot of problems and kinks to work out. So we actually made the three-year cycle a four-year cycle, by changing it by one year, just so that we could take that time to do it, but we ultimately changed it back to three.

So after Cycle 1, in doing this extensive review, we amended the requirements and how the study design worked so we could get good data in 2 and 3. So that actually -- so Cycle 1 was more about getting the program working, the design working properly. And then I think they used what data they could from Cycle 1, but it was more like preliminary sampling. And then Cycles 2 and 3 had good sets of data that we could see trends in on the core effects that we were seeing out of the present mill pulp and paper effluent.

Q Okay. If I can ask you to look at the "Abstract". There's just a couple of high level kind of questions that I want to review with you. I don't want to go into the report in a lot of detail. But if you can turn to the "Abstract", which is on Roman numeral iii, Can 5.

MS. BOYD: Okay.

Q And about seven lines down there's a sentence that begins "The national average response", it begins sort of the right-hand side of the paragraph.

MS. BOYD: Oh, right.

Q Okay.

> The national average response pattern measured for fish in both Cycles 2 and 3 was one typically associated with nutrient enrichment overlaid by metabolic disruption. That is, exposed fish have consistently shown evidence of increased food availability or increased food absorption (fatter, faster growing, with larger livers) together with disruption of allocation of resources to reproduction (smaller gonads).

So first of all, is that an observation that is relevant to the mills in B.C.?

MS. BOYD: What we do is we look at them on an individual basis. So there are definitely some mills that show enrichment. Less so that show what's metabolic disruption, and all that is is just changing where they're putting their energy. So they're putting less energy into reproduction is essentially what the concern is. And then there are mills that show no effects. And some mills that don't require EEM any more because they come within the exemption. So we have a mixed -- mixed results in B.C., but we're basically -- the intent is to take the data that -- the national data, so you get enough data to really look at what the pulp mill effects are, and probably it's harder to look on a region-by-region basis, so we just look at what our individual mills say versus the national results.

Q All right. So the -- there were mills in B.C. that showed the responses that are identified in the passage I just read?

MS. BOYD: yes. But more, more enrichment than the smaller gonads.

Q Okay. And then the next line reads:

> The average response for benthic invertebrate communities in both Cycles 2 and 3 was indicative of eutrophication, ranging from mild to more pronounced, partly depending on habitat type. More specifically, benthic invertebrate communities exposed to pulp mill effluent have commonly exhibited increases in abundance, together with some combination of increases, decreases or no change in taxon richness, depending on the degree of eutrophication.

Is that also indicative of the B.C. mills?

MS. BOYD: In some cases, but what we see here in B.C. mills also is there was historical impacts, like particularly on coastal mills, where you may have had more smothering from fibre mats, but teasing that apart, you're starting to see recovery because of the fundamental changes in the mill process or treatment. So we do see some enrichment, but where it may have been more severe was more historical, and then we tend to see recovery. But there are some present day

enrichment mills causing enrichment also.
Q Okay. So the -- those two observations, the enrichment that you see with the fish, and also with the benthic community, are those of concern to Environment Canada in B.C.?
MS. BOYD: I guess the short answer is we're not concerned just because the way the process is working, we're working towards solutions. Where we started with, you know, the pulp mill regulations and the EEM program, and hopefully it's okay to use "EEM" just because it's ingrained in my brain for 15 years now, but I'll try to be careful with my acronyms. But we worked through the process of trying to get good data, so that we could determine if we have adequate regulations. And then in the 2004 amendments to the regulation, we added a component of investigating cause. So if we saw effects in the mills, then there's a requirement now to investigate that cause. And then in the most recent -- well, at least the 2008 amendments, yes, in the most recent cycle we introduced an investigation of solution.

So we're moving to the paths, we are seeing some effects still in the receiving environment from current pulp mill effluents but we have ways of -- of working towards solutions to that. And I don't know if you want me add to the investigation of solution part.
Q No, I'm going to go to that as we move through the review, so...
MS. BOYD: Okay, sure. Yes, sorry.
Q What -- were any steps taken, then, with respect to the regulation following this national review of Cycles 1 through 3?
MS. BOYD: Yes. Like that, and the step was we had what was called a Smart Regulation Initiative, which allowed some policy senior management people in federal government, and industry, and there were ENGOs and First Nation participants, to look at the program and see what further needed to be improved. And so they came up with recommendations focusing on these two core national results that were coming up, how we could move towards focusing better on those, on fixing those effects that we're still seeing in pulp mill effluent.
MS. BAKER: Okay. Let me, before we move to that, let

me mark this national review that we've been looking at as the next exhibit.

THE REGISTRAR: Exhibit number 1026.

EXHIBIT 1026: National Assessment of Pulp and Paper Environmental Effects Monitoring Data: Findings from Cycles 1 through 3

MS. BAKER:

Q I'm going to come to that smart regulation --

MS. BOYD: Okay.

Q -- document right now, but just one last question before we leave this. Turning to CAN number 7, page number 7, so it's Roman numeral iv in the "Abstract", an "Executive Summary". In the fourth paragraph it reviews some of the observations that we just talked about, and it does say in the centre of this paragraph that:

This metabolic disruption --

- which you said hasn't been showing up in B.C. very much -

-- may include some aspect of endocrine disruption associated with problems in producing sufficient sex steroid hormones.

Do you see that line?

MS. BOYD: Yes.

Q Is that something that has been observed in B.C.? And it's particularly on the Fraser system.

MS. BOYD: We have, I guess, we're at -- the short answer is we're not seeing that in the -- we're not seeing that trend very well. But I guess I should also qualify on the marine side we've had difficulty in evaluating fish species effectively because the marine is just, you know, it's open, it's an open ocean. And so it's hard to tell, it's hard to do effective fish surveys, because they were more designed for freshwater. And we also have deep diffusers. But there is current study that has -- that is going on right now, to look at -- to focus on that particular effect and how we can come up with a better tool to evaluate it in the mills. And that's a large joint study that involves FP Innovations - PAPRICAN, which is

the industry research arm, and some of our Environment Canada sciences and some of academia, too, and the mills are able to use this -- this project to meet some of their investigation of cause requirements under the regulation. And it allows this -- a larger funding pool to better evaluate where there are -- there may be endocrine disrupting effects.

Q Okay. And when is that project expected to be completed?

MS. BOYD: I think, well, they've -- they started in Cycle 4, I'm not sure of the exact target date, but they -- yeah, I could say, I mean, they're kind of doing it in phases and coming up with tools and trying to find causes. So there's different components to the study. But offhand I'm not sure where their target date is right now. But within cycle 6, the cycle 6 is -- it could be a three or six-year cycle for a given mill.

Q When we talk about the different cycles in these national reviews, is it the assumption that they're always a three-year cycle? Is that how they're being measured, so it would be nine years or ten years since the regulation came into effect is when you did that national survey?

MS. BOYD: Yeah, Cycle 4 would have been 2003 to 2004, and then Cycle 5 was -- wait a second, I'm starting to lose track. We started Cycle 6 in April 1st, 2010, so Cycle 5 was 2007 to 2010, and Cycle 4 was 2004 to 2007.

Q Okay, thank you.

MS. BOYD: Sorry.

THE COMMISSIONER: Ms. Baker, could I just ask you for the purposes of the record, the witness is saying things like "we did something", or "they are doing something". I don't know who "we" is and I don't know who "they" are.

MS. BOYD: Good point.

MS. BAKER: Okay.

MS. BOYD: If I say "we", and I'll try and catch myself, I generally mean Environment Canada. I have to try and make sure, though, the distinction in conducting the Environmental Effects Monitoring Program, the mills are responsible for conducting it. We evaluate the information. But there's also, I guess, a "we" part in terms of evaluating the information, the "we" is Environment Canada as

the regulator, and "we" in terms of trying to improve the tools.

The study that I was just talking about for the investigation of cause small gonads study is probably more of a "they" in that it's -- some of our Environment Canada research scientists, but it's also the research arm of the mill, and it's helping -- it's a tool for the mills to meet their -- part of their requirement under the regulation.

MS. BAKER: Hopefully that explains it and I'll try and listen for those as we go through.

MS. BOYD: And I'll try and do better.

MS. BAKER:

Q Tab 27 of the Commission documents is the report of the Smart Regulation Review, or however you want to describe it. This is what you were talking about when you were talking about the Smart Regulation Review?

MS. BOYD: That's correct.

Q Okay. And this was, as it clearly sets out in its title, done to improve the understanding and improve the effectiveness and efficiency of pulp and paper environmental effects monitoring. You indicated that this came as a result of different stakeholders wanting to understand how the -- understand and assess the operation of the regulations?

MS. BOYD: Yes. I mean, as we went along -- we, Environment Canada, wanted to improve the -- how the program was working. This provided the most recent, I guess, opportunity, and it involved multiple stakeholders who were interested in the environmental effects from pulp mills. And so it was the next opportunity to try and improve how the program worked and to get -- and make sure we were getting the right results.

Q And were changes made to the regulation following that review?

MS. BOYD: Yes, there was recommendations made in here. There were changes made to the regulations. There were upgrades, improvements made to the technical guidance, and there's still some ongoing, or in progress, I guess I should say.

MS. BAKER: In Canada's list of documents, Mr. Lunn, could Canada's list of documents Tab number 1, just have that handy. If we can first mark this review document that we've just got on the screen

before you take it off.
THE REGISTRAR: That will be Exhibit 1027.

EXHIBIT 1027: Improving the Effectiveness and Efficiency of Pulp and Paper Environmental Effects Monitoring: A Smart Regulation Opportunity, December 2005

MS. BAKER:
Q And then Tab 1 of Canada's documents sets out a printout from the website, which shows the response to the Smart Regulation Initiative; is that right?
MS. BOYD: That's correct.
MS. BAKER: We'll have that marked please.
THE REGISTRAR: Exhibit 1028.

EXHIBIT 1028: Website printout "Smart Regulation Initiative for Environmental Effects Monitoring, Environment Canada's Response to Working Group's Report"

THE COMMISSIONER: So that's Canada...
MS. BAKER: Canada number 1.
THE COMMISSIONER: Canada 1.
MS. BAKER:
Q You have talked about investigation for cause. Did that happen after Cycle 3, so and did it relate to this Smart Regulation Review?
MS. BOYD: It was put into the regulation in 2004, which occurred prior to the Smart Regulation Initiative, which was in 2005. But what it did, one of the recommendations regarded having this larger joint study so that industry and Canada, the research side, to try and work out this one, the core effect, one of the core effects that was being observed and that was the smaller fish gonads or reduced reproduction.
Q Okay. So in 2004 specific approach was added to the regulation which required people to investigate cause, so where you would see an effect which showed up under Cycles 1 through 3, then there would be an opportunity for that proponent or mill owner to investigate the cause of that effect; is that right?
MS. BOYD: That's correct. It's a requirement, so if they see -- they confirm an effect on two

consecutive cycles, then there's a requirement in the reg to investigate that effect.

Q And have any studies been completed yet?

MS. BOYD: Yes. There were studies completed in Cycle 4, starting in Cycle 4.

Q Did any B.C. mills have to conduct investigative cause investigations?

MS. BOYD: They did, but what we discovered in some of them that it related to an historical effect. That's not the case in all, because some were moving into investigation of solutions, for example. So mills with enrichment. But more on the coastal mills tend to have -- there had been historical effects because there was -- because of the treatment or lack of treatment in place at the time.

Q If you can turn to Tab 16 of the Commission's list of documents. All right. And this document is the same kind of assessment that we saw earlier. This deals with assessment of Cycle 4 data; is that right?

MS. BOYD: That's correct.

MS. BAKER: I'll have this marked, please.

THE REGISTRAR: Exhibit 1029.

EXHIBIT 1029: National Assessment of Cycle 4 Data from the Pulp and Paper Environmental Effects Monitoring Program, January 30, 2009

MS. BAKER:

Q Thank you. And in this study were the same conclusions that were observed with respect to Cycles 1 through 3 seen, that you still had increased growth rate and relative liver size and decreased gonad size?

MS. BOYD: Generally speaking it was the same trend, but an interesting shift was that there was a shift in the small gonads, and part of that was determined more likely to be because a component of the mills were now in this joint study, so they weren't out in the field measuring, they were part of this joint study to evaluate the cause of the effects. So it seemed to suggest that we were on the right track in moving forward at that to focus on the reduced reproduction.

Q So the mills that had the most serious effects in Cycles 1 through 3 weren't actually assessed in

this phase 4 document.
MS. BOYD: Yes, that's correct.
Q Because they'd moved off to another study.
MS. BOYD: That's correct.
Q Okay. And was there anything of particular significance to the B.C. mills, the Fraser River mills in the Cycle 4 assessment?
MS. BOYD: I guess the short answer is some might not have required EEM, if they had two consecutive cycles of no effects, there were some mills that actually did not require the EEM in Cycle 4. Otherwise there were -- a lot of our investigation of causes in Cycle 4, as I was saying, tended to be trying to tease out what were historical effects from present effects. And so they weren't part of that joint study because they didn't actually fit the criteria that were set to be part of it.
Q But the seven mills that are on the Fraser system, can you tell us which of them were going into an investigative cause process, and which stayed on the regular cycles?
MS. BOYD: The Weyerhaeuser mill -- sorry, old name. Domtar Mill was on the track of investigating cause and investigating solutions on a nutrient scale, like a nutrient enrichment. But the -- the Upper Fraser mills were having difficulty, we -- sorry, the mills were having difficulty determining getting an adequate measure of the reproductive parameter for the fish because the species that was selected, which was a good sentinel, which was large scale suckers, seemed to -- but that they only spawned every other year. So the fish looked like it was big enough but it wasn't going to spawn that year, and you're trying to sample your parameters on these fish just before they're spawning.

So we haven't -- we hadn't got to the investigation of -- an investigation of cause phase there, because we were still working on getting the adequate data for evaluating effects on fish.
Q And would the Upper Fraser Mills include the Prince George mills?
MS. BOYD: That's correct, yes.
Q And would it also include the Quesnel mills?
MS. BOYD: That's correct, those are the Upper Fraser

mills.
Q All right. And then in Cycle 5, there was this introduction of a new concept, which is the introduction of the investigation of solutions component; is that right?
MS. BOYD: That is correct.
Q And what's the purpose of that?
MS. BOYD: I guess part of it was to address concerns in our consultation process on the regs that environmental groups and First Nations were expressing that we hadn't -- we weren't addressing effects. We were investigating the cause, but we weren't addressing the solution. So this was introduced in the regulation so that the next phase after determining the cause, then they would investigate a way to fix or to eliminate that effect.
Q And are any of the B.C. mills at that stage? It sounds like...
MS. BOYD: Yes, we have two that are doing that, that are -- one's on the Fraser system, one isn't, but two, it's for nutrient enrichment.
Q This is the Domtar?
MS. BOYD: Yeah, Domtar.
Q Okay. Now, the -- we do have the Interpretive Report for Environmental Effects Monitoring for the four mills in the Upper Fraser, and that was released in March 2010. It's at Tab 13 of the Commission's documents. So this shows as being done for the Canfor Limited Partnership, Quesnel River Pulp, Cariboo Pulp and Paper, but that's actually four mills; is that right?
MS. BOYD: That's correct.
MS. BAKER: Okay. I'll have this marked, please.
THE REGISTRAR: Exhibit 1030.

EXHIBIT 1030: Upper Fraser river Environmental Effects Monitoring (EEM) Cycle Five Interpretive Report, March 2010

MS. BAKER:
Q Now, just it speaks for itself, and I'm not going to, given our short time, I'm not going to go through it in great detail. But I want to understand a few things. Like, if you turn to page 5-1, and I don't know what the PDF number for that is, I'm sorry. So "Fish Tissue Analysis" --

whoops, there we go. "Fish Tissue Analysis" is on page 5-1, and it indicates here that there was no fish tissue analysis required. How was that decision made?

MS. BOYD: It's based on the requirements in the regulation. It stipulates that if dioxins and furans in fish tissue exceed 15 picograms in the muscle tissue, or 30 picograms per gram in the liver, then it's required -- the mill is required to conduct a fish tissue survey. Or if their effluent exceeds -- if their effluent dioxins and furans are measurable, then they are required to do so. But generally the dioxins and furans regs have eliminated the dioxins and furans, and so we generally see no measureable dioxins and furans.

Q And when was the assessment done of fish tissue to rule out that as a component, a regulatory component for these mills? Would that have been done on the first cycle, or the second cycle?

MS. BOYD: I'm trying to remember, sorry. Can I ask Mike?

Q Yes.

MS. BOYD: Just because he was -- it was his mill at the time, but I'm just thinking that they weren't triggered in ever.

Q Certainly Mr. Hagen can answer this if it's -- if he's got the information, absolutely.

MR. HAGEN: Yes, I can answer that. I'm just waiting for the text to catch up a bit here, so I can see what the question was.

Okay. I guess the question is response to dioxin and furan monitoring, as we had a trend monitoring program conducted all through the 1990s, which was about the time that Cycles 1 and 2 were being conducted. And there were no -- I don't believe there were health advisory in the Upper Basin of the Fraser River. There were studies conducted. There were health advisories issued in the Strait of Georgia for bottom fish and for crab, and some of those they're still in place.

I'm just checking to see if I've got the question correct here. Perhaps you could rephrase the question so that I can be clear on that.

Q Sure. I was -- Ms. Boyd had explained that they weren't showing any fish tissue contaminant and I asked when was that assessment done, because it

sounds like that is not -- no longer being done, that there's no longer an analysis of fish tissues to see if those contaminants are present. So when was the last sampling done, and how can you rule that out for the present.

MR. HAGEN: Okay. There is still sampling being conducted in the Strait of Georgia for those mills in the marine environment for Crofton and Harmac and Port Mellon, and those are being conducted every three years.

Q This is for the Quesnel and the Prince George mills I'm asking about.

MR. HAGEN: I don't believe there is fish tissue analysis going on in the Fraser Basin, that dealt in the freshwater environment, no.

MS. BOYD: But ever, I don't think it ever was triggered, that's...

MR. HAGEN: No, it was never triggered. No. The monitoring was done under the National Lakes and Monitoring Program initially, but to the best of my knowledge it was never triggered under the EEM provisions in the ***PPER***.

MS. BOYD: Because it would have been below the limits.

Q Okay. It was below the limits always, is that what you're saying?

MS. BOYD: Yes. Well, yeah, like once the regulations came in, and they were under the regulations. I don't believe they were ever triggered in to having to do that, the dioxin and furan monitoring.

Q All right. And then similarly on the following page, which is 6-1, this is the "Benthic Invertebrate Survey", it says that that is also not being required for these mills, and how is that assessment done?

MS. BOYD: That was done in the cycles before, so in Cycles 2, 3 and 4, they would have looked at the exposure and reference area and they would have concluded that there were no effects in the core benthic invertebrate parameters. So then in response to what the regulations allowed, they are able to not require another survey for six years.

Q Okay. So they're now on a six-year cycle for that particular --

MS. BOYD: For that component.

Q Okay. So the only sampling that's being done right now is the fish survey sampling; is that

right?
MS. BOYD: That's correct.
Q Okay.
MS. BOYD: And there is sublethal toxicity testing.
Q Right. And so was enrichment found in these mills?
MS. BOYD: Yes, that was the general -- it was either enrichment or there was no significant difference in the core parameters but it was more of an enrichment, notwithstanding the issues that we're still trying to evaluate with the fishery production.
Q All right. And is that why the mills are undergoing the investigation of cause phase, or are they in that...
MS. BOYD: These ones are still looking at the fish, they were trying to evaluate the fish. They've evaluated the other parameters for fish, but they were having difficulty with the reproduction, so that's where the -- this study was now focused.
Q Now, since the regulations were brought in has there been an assessment by Environment Canada generally about in particular looking at the dioxin issue, has the control of dioxins been effective since the regulations were brought in in 1992?
MS. BOYD: Yes. And I don't know if this might be a better area for Mike, but the short is that it was a significant drop in the dioxins and furans, essentially 99 percent elimination from the -- basically the two, dioxins and furans regulations under ***CEPA***, but also the improvements that the mills made under the ***Pulp and Paper Effluent Regulations*** also contributed to those reductions with better treatment.
Q All right. Mr. Hagen, you did a study, as well, did you not --
MR. HAGEN: Yes.
Q -- with respect to dioxins and furans?
THE COMMISSIONER: Ms. Baker, would this be a good place for the break?
MS. BAKER: I wonder if I -- I've got, like, one or two questions and then I can finish pulp completely and come back with mining. Would that be possible? Okay.
Q So that study -- sorry, Tab 12 in the Commission's documents. All right. You're the author of this

study that assessed the effects of --
MR. HAGEN: Yes, the lead author, yes.
Q And what was the general conclusion of that study?
MR. HAGEN: The general conclusion is essentially that the measures brought in by the mills in response to the regulatory package and the work they did prior to that resulted in a 97 percent drop in dioxin and furans or greater in effluent, and also we measured a drop of 85 percent in crab or greater, in other species of fish in the marine environment. Talking about the environment here. So all of those changes that the mills made in their process resulted in significantly lower levels in the environment that we measured.
MS. BAKER: I'll have that marked, please.
THE REGISTRAR: Exhibit 1031.

EXHIBIT 1031: Hagen et al, Environmental Response to Decreased Dioxin and Furan Loadings from British Columbia Coastal Pulp Mills

MS. BAKER:
Q And I just want to finish up by asking about concerns of significance currently in pulp mill effluent and Fraser River sockeye, and I'll ask you that, Ms. Boyd. What concern, or has Environment Canada identified any concerns of significance. We've talked about the enrichment issue. Are there any other concerns of significance with pulp mill effluent and Fraser River sockeye?
MR. HAGEN: I'm just waiting for the caption to catch up a bit.
MS. BOYD: Oh, was that to Mike? Sorry.
Q No, it was -- it was to you.
MR. HAGEN: It's real-time captioning, I'm relying on this, but it takes a few seconds.
MS. BOYD: The short is that EEM per se doesn't evaluate the sockeye. It's designed to look at resident fish species. But I guess the potential comparison is that the sockeye would only be in the river for shorter periods of time, going up through like past the mills when they're going up to spawn, or coming down as smolts. So we target the resident species because if we got no effects by comparing the exposure and reference area, we

couldn't conclude that there were no effects because they have less -- they were less exposed.

Q Are there any pulp mills discharging into rearing lakes, rearing lakes for Fraser River sockeye?

MS. BOYD: Not to my knowledge.

Q Okay. And then on the PPR, paragraph 195, there's a correction, I think to be made, page 71.

MS. BOYD: Could I just add on that --

Q Yes.

MS. BOYD: -- comment, just in -- Bob just suggested, like, in Kamloops Lake, that would be one potential. I didn't think they reared in there, but then that would be a DFO question.

Q Okay.

MR. GRACE: Do you want me to elaborate?

Q Why don't I -- I want to get through this last question with Ms. Boyd and I'll come back. I'll just make a note to ask you that when I get to those questions with you.

So paragraph 195, the last sentence of this paragraph says:

> The response of PBDEs to improvements in pulp mill processes is not yet well understood.

Does Environment Canada understand that there are PBDEs in pulp mill effluent?

MS. BOYD: The short answer is I recall seeing something from our Environment Canada scientists that suggested they didn't believe they were in the pulp mill effluent, but I don't know what that source is. The short of it is they may be, but it's not an area that I know specifically.

Q Mr. Hagen, do you have anything, any other information to assist there?

MR. HAGEN: What was the question?

MS. BOYD: Are you aware of the PBDEs in pulp mill process.

MR. HAGEN: No, that's not my area, either, so I can't really comment on that.

MS. BAKER: Okay, thank you. Those are my questions for now, thank you.

THE COMMISSIONER: Thank you.

THE REGISTRAR: The hearing will now recess for 15 minutes.

(PROCEEDINGS ADJOURNED FOR MORNING RECESS)

(PROCEEDINGS RECONVENED)

THE REGISTRAR: The hearing is now resumed.
MS. BAKER: Thank you.

EXAMINATION IN CHIEF BY MS. BAKER, continuing:

Q Mr. Hagen, we're going to start talking about metal mines now. First of all, how many mines, metal mines on the Fraser system that are subject to the ***MMER***?
MR. HAGEN: Okay. We have seven mines that are operating and in the Fraser basin, but just to clarify, the ***MMER*** only regulates those mines that are in commercial operation and are discharging above a 50-cubic-metres-per-day threshold. Those mines are the Huckleberry Mine on the Tahtsa Reach of the far west end of the Nechako Reservoir, and the Endako Mine at Fraser Lake, the Gibraltar Mine at McLeese Lake, which is north of Williams Lake. Those are all large open-pit operations. And a small gold mine, very small, 120-tons per day, Bralorne Mine, is also an ***MMER*** mine.

There are three operating mines that are not subject to the ***MMER*** because they don't have a discharge. But the Highland Valley Copper Mine near Logan Lake, the Mount Polley copper open pit near -- just south of Likely, and the QR Mine on the Quesnel River. It's a small mine, I'm not sure if it's actually open right now, but they do plan to operate soon.

Now, there are also numerous operating mineral and placer operations, and I'm not sure if you want me to clarify that as well.

There are three mines that are listed as metal mines in the PPR and I wonder if I should just mention that those aren't metal mines, according to us, or whether we can leave that.

Q Yes. Let's go to the PPR and deal with that. If you can turn to page 75, please, of the PPR. So first of all, paragraph 201 indicates that there's six, but you've said there's seven, because you have added the Bralorne mill into the list?
MR. HAGEN: Yes, add Bralorne to that list.
Q Okay. And Bralorne is located where?
MR. HAGEN: Bralorne is located at Bralorne, it's just south of Gold Bridge on the Bridge River system.

Q Okay. And what is mined at Bralorne?
MR. HAGEN: Bralorne is an underground gold mine.
Q And there's a similar correction that should be made at paragraph 265 on page 100, that should be seven. And you would say that there's four that are subject to the ***MMER***, including --
MR. HAGEN: Yes, Bralorne is also subject to the ***MMER*** at this time.
Q And was there something else you wanted to correct? I thought you said that there were some mines listed as metal mines that you didn't agree with.
MR. HAGEN: This is actually in reference to Table 3-7, which is appended at the back of the PPR. In that table there are a couple of mines mentioned as metal mines. One of them is Wingdam, which is on Lightning Creek, downstream of Wells Barkerville. The other is Keithley Creek north of Likely. Those are placer operations. You don't consider them mines.
Q Okay. Just to be clear, you're talking perhaps about a technical report, rather than the PPR; is that right?
MR. HAGEN: I'm not sure.
Q Okay.
MR. HAGEN: I'm talking about Table 3-7. It may well be the technical report, because I haven't been able to find that table again.
Q Yes.
MR. HAGEN: So, yes, you're probably correct on that. I also wanted to mention Craigmont is listed as a metal mine. It actually was a metal mine, a copper open-pit mine that closed in 1983. And just to clarify it's still in operation, reworking the tailings of that facility, but we do not consider it a mine. They're processing magnetite out of the tailings, but it's not a mine under the ***MMER***.
Q Do any of the ***MMER*** mines that you've talked about, Gibraltar, Huckleberry, Endako or Bralorne, do they drain effluent into rearing lakes, sockeye rearing lakes?
MR. HAGEN: Rearing lakes? Yes, I believe Endako has discharges into a creek that drain into the Francois Lake, and they also have discharges drain into the Endako River, which subsequently drains into Fraser Lake, and I'm not aware if those are

rearing lakes, but they are downstream lakes from Endako.

Q Okay. And Highland Valley Copper, why is that not an ***MMER*** mine?

MR. HAGEN: Highland Valley Copper is in a dry area and they have a water deficit, so all the water in their tailings pond is recycled to the mill, and they don't have a discharge and they have not triggered themselves into the ***MMER***.

Q I understood that there was discharges into Witches Brook at Highland Copper; is that not right?

MR. HAGEN: I'm not familiar with that. It could be. You know, I shouldn't speculate, so I'm not sure. But they have informed us that they do not have a discharge, and our inspectors have been on site and they confirmed that, to the best of my knowledge.

Q Are all the closed and abandoned mines in the Fraser River known to Environment Canada?

MR. HAGEN: Short answer is probably not. There are a considerable number of closed and abandoned mines in the Fraser Basin. I am aware of 15 reasonably large closed operations, and I know that there are at least 12 more that are slightly smaller. I'm not sure how much detail you would like me to go in for that. Do you want me to discuss some of these larger closed operations?

Q Well, first I want to ask you if abandoned mines or mines that were closed prior to the ***MMER*** being brought in are subject to the ***MMER***.

MR. HAGEN: No, they're not. The ***MMER*** only applies to mines that are operating. So mines that were operating in 2002 were captured by the ***MMER***.

Q Okay. And the conditions for a mine to be subject the ***MMER*** is that they -- you indicated the discharge amount, but they also have to discharge into waters frequented by fish; is that right?

MR. HAGEN: That's correct, yes.

Q And if a mine becomes subject to the ***MMER***, for example, if at some point in its history it has effluent discharge of 50 cubic metres a day, is it then forever more subject to the ***MMER***, even its discharge limit -- or discharge averages go down?

MR. HAGEN: It is, yes. If a mine closes, it may apply for a recognized closed mine status, which gives the mine three years after they close to -- they

continue their monitoring for tree years and conduct one more EEM program, and at that time they may be a recognized closed mine, then subject to the general prohibition of the ***Fisheries Act*** s. 36(3), but no longer subject to the ***MMER***.

Q Okay. So for any mines that are not subject to the ***MMER*** for whatever reason, because they were closed or abandoned before the regs came in, or because they go through a closing process under the regulation, what does -- how does Environment Canada become involved in dealing with discharges from those, if there are any discharges?

MR. HAGEN: If there are any discharges from those closed mines, then, well, they are still subject to s. 36(3) of the ***Fisheries Act*** and our inspectors may visit and sample there to see if there's a problem.

Q Okay. Now, the ***Metal Mining Effluent Regulations*** were modeled in large part on the pulp regulations we've just been discussing with Janice Boyd, right?

MR. HAGEN: Yes, that is correct. They are alike in many things.

Q Okay. So perhaps you can simply tell us what the differences are between the two sets of regulations.

MR. HAGEN: Well, the essential difference is probably that metal mining has a slightly different -- again for monitoring cycles, there's two aspects of that. One that mines may be captured at any time, so they tend to be out of step with each other. Each mine will go through its phase on a three-year cycle, to determine if there are effects, and confirm the effects that they have found, or confirm that they don't find effects. If a mine does two cycles -- two phases, and does not find or confirm effects on fish or benthos or fish survey parameters, then they may do their subsequent cycles in six years after that. However, if they do find effects, and confirm effects, then they're triggered into an extent monitoring survey which is on a two-year cycle and subsequent to that investigation of cause, like again on a two-year timetable. So that's one major change. There are differences in the way the receiving environment effluents characterization is conducted and reported. There

are some differences in the way the sublethal toxicity is reported. But the philosophy and the structure of the program is largely similar.

Q In the pulp regulation discussion we heard about the investigation of solution stage. Is that something that is contained in the mining regulation?

MR. HAGEN: As I'm aware, at this point we have not had that discussion yet, no.

Q All right. But the investigation of cause component in the mining regs?

MR. HAGEN: Many metal mines now are moving into a third phase and a fourth phase, and investigation of cause is something that they will need to do. So we are providing guidance and working out a way for mines to note to do without that.

Q And what -- is there fish tissue sampling done under the mining regs?

MR. HAGEN: Yes, the fish tissue survey is required if any mine has a detectable mercury in their effluent above threshold, and if they do detect mercury in their effluent, then they're required to sample mercury in fish tissue in the environment.

Q The parameter of monitoring, the actual parameters that are to be monitored are set out, and I think a document that might be easiest to show this is a document that I'm going to come to a little bit later, but I'll introduce it now, and that's the Summary Review of Performance of Metal Mines, which is a very long document and we've just included some excerpts relevant to the Fraser System. So if you can just turn to the very back of that excerpt, any of these pages relevant to the mines will be fine, so you could turn to page 90, for example.

THE COMMISSIONER: Which tab are you at?

MS. BAKER: It's on the screen, so tab --

MR. LUNN: Tab 10.

THE COMMISSIONER: Tab 10, thank you.

MS. BAKER:

Q Tab 10, page 90, would be an example. If you turn that so we can see it. The parameters that are set out in the column on the left, right down to -- let's just stop at the Rainbow Trout line. So the parameters from the top, arsenic, I think that the top one is, I could be wrong, down to "Flow",

those are set out in the regulation as parameters to be measured in the effluent?

MR. HAGEN: Okay. What we're looking at here is the parameter list, on the left column is the list of deleterious substances from Schedule 4, and pH range, and flow must be monitored weekly. The acute lethality test, the ***MMER*** has the same prohibition of acute lethality as the ***PPER*** does, so we have that. And Daphnia magna is required to be sampled.

Q Okay. How were those parameters determined, do you know?

MR. HAGEN: These parameters are actually the ones that were listed in the old ***MMLER***, and before the ***MMER*** were -- while the ***MMER*** were being developed prior to 2002 we had a process called the AQUAMIN process, which was a review of parameters, which were in the old ***MMLER***, and the decision was made at that time just to incorporate the same parameters into the ***MMER***.

Q Okay. So in terms of compliance, the mines are required to sample everything that's set out in the parameters list on the schedule set out in the regulation.

MR. HAGEN: Yes. The -- all mines are required to sample these parameters weekly. There are provisions in the regulations that if some of these are non-detect, or at a very low level, after a certain amount of sampling, 12 months or whatever the period would be for the parameters, the mine may reduce the frequency of monitoring for some of these.

Q And these parameters are set nationally, is that right, so these would be required for all mines in the country.

MR. HAGEN: These are national level parameters, yes.

Q Okay. And so they're not necessarily reflective of particular contaminants expected from an individual mine.

MR. HAGEN: No, they're not. We -- it's a national regulation, so the requirements are the same for all mines.

Q Okay. Can additional parameters be required by Environment Canada to be monitored at an individual mine?

MR. HAGEN: Additional parameters are not required for individual mines because it's not specified in the

regulation. We do have mechanisms where we may recommend that additional parameters be monitored and reported, but that's not a requirement, it's a recommendation.

Q And does -- does Environment Canada work with the province on developing additional parameters for the sites that may be part of the --

MR. HAGEN: Yes, we do. We do.

Q -- the provincial system?

MR. HAGEN: Yes, we do. We have the same local monitoring committee scheme with -- that Janice spoke of, we have that for metal mines. So the province, ourselves, and the mines and any stakeholders that may be involved can discuss which parameters should be part of the mine monitoring program, so that all requirements are met.

Q Okay. And the monitoring results from these parameters that we see on the screen, those are reported through RISS system, the same as the pulp results?

MR. HAGEN: They are, yes.

Q Okay. And is the database treated the same way as we discussed with respect to pulp for enforcement purposes?

MR. HAGEN: Yes, it is.

MS. BAKER: Okay. I should mark this document that we have in front of us as an exhibit. I'll come back to it, but given that we've spent some time on it, if we can have this marked, the Summary Review of Performance of Metal Mines.

THE REGISTRAR: Exhibit 1032.

EXHIBIT 1032: Summary Review of Performance of Metal Mines Subject to the *Metal Mining Effluent Regulations* in 2009, September 2010

THE COMMISSIONER: While you're at it, Ms. Baker, just on this table that you introduced, page 90, just all of the tables that are at least in this tab, I think all of them have "NMR", which means "no measurement required", with the exception of the table you introduced at page 90, which has, I think, "ND" or do I have that correctly.

MR. HAGEN: Yeah, that will refer to the part of the requirement I mentioned where if a mine fulfilled certain requirements, their measurements are very

low, non-detect. For example, then they may go onto a reduced monitoring frequency. So instead of having to monitor every month, or every week, and report a monthly average, they may be monitoring quarterly. So during those months when they don't monitor because they have achieved a lower frequency of monitoring, we have that "NMR", no measurement required, because they're on a reduced frequency.

THE COMMISSIONER: Thank you.

MS. BAKER: Thank you.

Q And this document that we've just marked as Exhibit 1032, is this published every year, this summary document?

MR. HAGEN: This document is intended to be published every year. It's published out of our Mine Processing Division in Ottawa and their resources may limit whether they actually do publish it every year, but it's their document. So I know they do try to do that.

Q That's the intention.

MR. HAGEN: That's the intention, yes.

Q Okay. And it's made public, this document is; is that right?

MR. HAGEN: It's a public document, yes.

Q And if -- I take it if a mine has agreed to do additional parameter monitoring on a recommendation from Environment Canada, that wouldn't actually show in this, this just sets out the national required parameters?

MR. HAGEN: That is correct, yes. This document just shows the basic requirements of deleterious substance monitoring.

Q Okay. I'd like to move now to environmental effects monitoring for mines. And we've covered a few things already, so I won't need to deal with them. But one thing we talked about with pulp was reference sites, so that to do an examination of effects, they would look at a reference site and then the exposed site, and do a comparison. Is that the same for metal mines?

MR. HAGEN: Yes, that is -- that is the same for metal mining. It is a key concept in EEM that we compare a exposed area to a reference area, and if there are differences between exposed and reference, that is our effect.

Q And are there -- we heard with the pulp that they

look for an upstream and a downstream site. Is that a challenge for mines?

MR. HAGEN: It is indeed a big challenge in many cases. The ideal situation would be a mine or a mill discharging into a river. You use the downstream of the diffuser as the exposed area, and upstream as the reference area. But many mines, if they discharge to headwater creeks, there is no upstream. So it's a challenge to find appropriate reference areas in that case.

Q Has that affected any of the results that have been obtained under the program?

MR. HAGEN: It may challenge the interpretation of the results, yes. If you are using a reference creek that is in a different watershed, for example, it's a challenge to filter out what might be habitat effects or habitat reasons to explain the effects. It may not -- if we have a difference between a reference and exposed, is it the effluent or is it a habitat issue. So that is one question that we need to look at.

Q The parameter, effluent parameter monitoring is published in this national document. Is there -- is there a similar publication of EEM results for individual mines?

MR. HAGEN: Individual mines, as for pulp and paper, issue interpretive reports each cycle, so that data is in their individual interpretive reports.

Q And are those interpretive reports made available on a website or another public way that access can be made to those documents?

MR. HAGEN: Those interpretive reports are not available electronically, but they are available in Departmental library, for example.

Q All right. And how often are those interpretive reports done, every three years?

MR. HAGEN: Well, as I explained, every three years for the first two phases and then subsequent to that would possibly be every two years if the mine is triggered into a extent magnitude survey or an investigation of cause survey.

Q Has there been any results to date from metal mines -- interpretive reports for metal mines in the province that show significant impacts on fish from metal mine discharge? I'm talking here about the Fraser River mines.

MR. HAGEN: Okay. You're speaking specifically of

Endako, Huckleberry and Gibraltar, that have conducted EEM programs. Gibraltar has not yet issued their first cycle interpretive report. I'm expecting that next month. So I can speak to Huckleberry and Gibraltar. And just to keep it short, the Huckleberry results through their first two surveys could not confirm that there were effects on fish or benthos in that -- in the area that they were sampling. So their third cycle will be a -- they changed their final discharge location, so this third cycle which they will be doing this summer will be to double-check to see if there were or were not effects.

Gibraltar, or rather Endako had conducted two surveys and they are finding effects on both benthos and fish, young of the year fish, they conducted a juvenile rainbow trout survey of the fish survey. Their general capsule summary of the effects on benthos, they're finding an enrichment effect, and in fish they tend to be finding an inhibitory effect on rainbow trout, although that's in some respects. In other respects it seems to be enrichment and there's uncertainty there whether it is a habitat issue or perhaps a temperature issue with the water being a little bit warmer.

Q And what is an inhibitory effect?

MR. HAGEN: An inhibitory effect would be depressed or lower enrichment or a lower abundance or a richness of benthic invertebrates, or in fish endpoints, slower growth, less condition, smaller sized at age would be inhibitory.

Q And Bralorne was another ***MMER*** mine you indicated earlier. Has it just reopened or commenced operations, why is there no reports for it yet?

MR. HAGEN: Bralorne, I'm just wondering what do I say about Bralorne. There's a little bit of a dispute there, whether they are actually are subject to the ***MMER*** at this point. And they have not submitted an interpretive report at this point.

Q But they have been in operation for some time?

MR. HAGEN: They operated for a couple of years in the early 2000s and then they closed, and now they've just reopened, and I think poured their first gold bar just last month. So they've only just started under that particular round of commercial operation.

Q Similar to the pulp regulations, after the first cycle of mining regulations, there was a review done of the first cycle reports; is that right?
MR. HAGEN: That's correct, Just as the pulp and paper regs have reviewed each cycle, to check to see what's working, what's not working, we did that with metal mining, as well.
Q All right. And that is at Tab 8, it's dated August 2007.
MR. HAGEN: Yes.
Q Is this the document?
MR. HAGEN: Yes, this is the Metal Mining Environmental Effects Monitoring Review Team Report.
MS. BAKER: Okay. I'll have that marked, please.
THE REGISTRAR: Exhibit 1033.

EXHIBIT 1033: Metal Mining Environmental Effects Monitoring Review Team Report, August 2007

MS. BAKER:
Q All right. And if I can just turn to the recommendations that were made, and these begin, or they're summarized in the "Executive Summary" beginning at Roman numeral iv. I'm just going to ask you about a couple of these, there's many recommendations. Go to the next page, please, Recommendation number 11. Recommendation 11 indicates that the -- this is reflecting what we had talked about earlier, that the site-specific variables are not presently recorded in RISS; is that right?
MR. HAGEN: Okay. I'm not as familiar with RISS as some of us are, but I know that the RISS system has been enhanced, updated over the last couple of cycles and I believe they are including some of these further recommendations. yes.
Q Okay. Number 15, so the next page, Recommendation 15 indicates that:

Both electrical conductivity and selenium should be added to the list of required effluent and water quality variables...

Has that been done?
MR. HAGEN: Some of these recommendations require an amendment to the ***MMER*** and I do know that the

national EEM office is proceeding with this regulatory package which would include recommendations such as Recommendation 15.

Q So your understanding is that there is a proposal to amend the regulation to include both electrical conductivity and selenium as required parameters?

MR. HAGEN: Yes.

Q Okay. Number 20. Number 20 says that:

> Regional coordinators should verify that steps were taken by mines to ensure that method detection limits (MDLs) recommended in the Guidance for the Sampling and Analysis of Metal Mining Effluents are attained when reporting results.

What is this -- what's the issue here, and what's been done about it?

MR. HAGEN: I have two comments about Recommendation 20. One is that one of the things we noticed earlier on was that the method detection limits for mercury were not being met, or we were pretty close to the actual detection limits, the detection limit was close to the threshold that we were using to monitor compliance. So we recommended that that be made more stringent. And I have also noted that the recommendation -- the recommended method detection limits in Schedule 3, I believe, column 4, may be revised. some of them were incorrect, so we have to do a bookkeeping amendment to fix that.

Q And then Recommendation 23 says:

> As the status quo is considered unacceptable, Environment Canada should consider changes to sublethal toxicity testing within the EEM program.

What is that about?

MR. HAGEN: This was with reference to sublethal toxicity, and this was the one recommendation out of the 40 that was somewhat, I want to know if I should say controversial, but the metal mine EEM Review Team consisted of stakeholders and industry, from environmental groups and from government agencies, and each of these stakeholders had different perspective of what

would be suitable in the program. So the one area of disagreement within that team was the sublethal toxicity. So we're still discussing that and we're still working on what the move forward should be.

Q What was considered -- why does it say the status was considered unacceptable? What was unacceptable about it?

MR. HAGEN: Well, I guess the essential thing to say would be mine operators, for example, would like to drop the fish test, whereas the environmental groups would support keeping it. So we have that kind of debate going on.

Q So for now it stays in as it is?

MR. HAGEN: For now it's still status quo, but the options are being further assessed.

Q Okay. Tab 9 of the Commission's document list is a December 2007 National Assessment of Phase 1 Data. How is this document different from the one we were just reviewing?

MR. HAGEN: How does this document differ from the Review Team document? Okay. This is the national assessment which is conducted by the National EEM Office. It's analogous to the national assessments for pulp and paper that you discussed with Janice. There's only been one so far. A second one is -- it's complete, in translation, and should be issued very shortly. So this National Assessment of Phase 1 Data just looks at the data and comes up with a national overview of what the parameters are saying, what the monitoring has suggested the effects are from mining effluents.

MS. BAKER: Okay. I'll have that marked, please.

THE REGISTRAR: Exhibit 1034.

EXHIBIT 1034: National Assessment of Phase 1 Data from the Metal Mining Environmental Effects Monitoring Program

MS. BAKER:

Q Were B.C. mines part of this national assessment?

MR. HAGEN: Yes, benthos data was included in the national assessment, but when this national assessment was done, a look at that data was taken to ensure that the data were comparable on a national basis. So fish tests in B.C. tended to

be non-lethal, juvenile fish surveys, and those kinds of surveys were not included in the national assessment, so (indiscernible - rapid speech) of the fish, no, for B.C.

Q So to the extent effects on fish are described in this report, do those have any relationship to B.C., the status of fish in B.C., if our data wasn't included in the report?

MR. HAGEN: Well, the national assessment would indicate general trends, in any event. So if you look at the site-specific results, it might be different, even if the data had been included in the national assessment.

Q Has there been any subsequent study -- oh, I think you actually answered this already, when you said this is the only one so far.

Have in this document it reports --

MR. HAGEN: Yes, there was a second assessment and it's ready to be released very shortly.

Q Yes, sorry. Yes. This report does indicate some effects on fish and on benthic invertebrates, and that's set out in the "Executive Summary" at Roman numeral iii. And I'll just -- at the very last paragraph it says that for fish there were significant reductions in condition and relative liver size. And for benthic invertebrates it shows significant reductions in density and taxon richness. So with respect to both those trends, is that something that has been seen on the mines in B.C. in the Fraser system?

MR. HAGEN: Yes. This is a national scale conclusion. So if you look at these results site specifically in the Fraser system, the Huckleberry situation would not support that because they have not tended to find effects there. Endako capsule results so far show both inhibition and enrichment effects. So again the national level conclusion will include the results like that, but it won't necessarily explain exactly what's happening at that site specific location. So Endako just differs a little bit.

Q Okay. And what about Gibraltar?

MR. HAGEN: And Gibraltar has not issued their first EEM interpretive report yet, so I don't know what their results have found.

Q Okay. We heard from Ms. Boyd that she's the only EEM Coordinator for pulp in B.C. How many mining

EEM Coordinators are there?
MR. HAGEN: Okay. We've got -- well, I'm the Metal Mining Environmental Effects Monitoring Program Coordinator for British Columbia mines, but we do have a person in Yukon who covers the Yukon mine, he's the EEM Coordinator for the -- for Yukon.
Q Do you have any staff that work under you?
MR. HAGEN: No.
Q Do you visit the mines yourself to see if they are complying or working within the regulation?
MR. HAGEN: Yes, I do do conduct site visits on occasion. The purpose of a site visit is to essentially become more familiar with the area. It helps to gain insight into what the results are, and also to observe the environmental consultants as they do their monitoring program. Different consultants may be doing things in a different way. So if you observe what they're doing, you have a better idea of how that -- the results may be interpreted or gain some insight into different practices that way.
Q All right. And the document that we marked earlier as Exhibit 1032 sets out compliance rates across the country. Do you know what the rate of compliance is for mines in B.C. with ***MMER*** regs?
MR. HAGEN: It's not really something that I follow closely, but my impression is that the B.C. mines are generally in compliance with most of the parameters, or if they're not, it's usually a relatively minor issue.
Q And what about reporting under the regulation. Is that -- are the mines generally compliant with sending in their data?
MR. HAGEN: They are, yes.
Q Okay. Thank you. I'm going to move now to some provincial witnesses. Mr. Grace, you're an Environmental Impact Biologist for the province. What is that -- what are your responsibilities as an Environmental Impact Biologist?
MR. GRACE: Well, there's two major parts to that job. One is to conduct my own monitoring programs, basically design them, conduct some of the monitoring often with others to help, and tabulate and assess the data and write reports. Probably what's more relevant today is also do a lot of impact assessment work, that involves review of consultants reports both under the ***Environmental***

Assessment Act under permits, and other legislation, provincial legislation.

Q All right. And you had a comment that I deferred you to make, which related to Kamloops Lake and whether it was a rearing lake. What did you want to add there?

MR. GRACE: Sure. Janice and I are involved in a Thompson River monitoring partnership group, over the last seven years, and as part of that we meet annually and we have presentations from various people. A couple of years ago we did have a presentation from a DFO research scientist, who had done studies on Kamloops and Mabel Lakes that showed that there was some rearing of sockeye in Kamloops Lake.

Q Thank you. Now, permitting of mines and mills in B.C. is down under the ***Environment Management Act***?

MR. GRACE: That is correct.

MS. BAKER: Okay. And we have a couple of permits just for reference purposes that I'd like to mark, put in the record, and the first one is at Tab 18, and this is a mill permit for Cariboo Pulp and Paper. It's got the cover documents and then the actual permit begins in a few pages, there.

THE REGISTRAR: Exhibit 1035.

EXHIBIT 1035: Permit and cover documents for Cariboo Pulp and Paper Company

MS. BAKER:

Q You recognize this permit, or you recognize it as a permit issued under the ***Environmental Management Act***?

MR. GRACE: Yes, it's a permit issued under the ***Environmental Management Act*** for Cariboo Pulp and Paper located in Quesnel.

Q Thank you. And I have also a permit for Gibraltar, which is a mine, and that's at Tab 20. It should be the next -- there we go. Sorry, Mr. Hill, this is -- you recognize this as a permit for the Gibraltar Mine?

MR. HILL: Yes, that's an effluent discharge permit for Gibraltar Mine.

MS. BAKER: Okay. So we'll have that marked, please.

THE REGISTRAR: That will be Exhibit 1036.

EXHIBIT 1036: Permit and cover documents for Gibraltar Mines Ltd.

MS. BAKER:
Q All right. And turning first to the mill permit, so this permit sets out the discharge limits, or the discharge monitoring requirements, I should say, and that's at page 8 of 13 of the (indiscernible - background noise), so if you can probably move down seven more pages on the screen that should show us. Yes. All right. So the permit sets out the exact parameters, or the frequency, I should say, for monitoring. "Authorised Discharges" are set out at page 3.
THE COMMISSIONER: So which tab are you on now?
MS. BAKER: The same tab, at page -- sorry, it's Tab 18, and page 3 sets out the authorized discharges.
MR. LUNN: Is that 3 or 13?
MS. BAKER: Yes.
Q That's correct?
MR. HILL: Sorry, me?
Q That's correct?
MR. GRACE: Sorry, I didn't catch your question.
Q This is the -- sets out the authorized discharges under section 1?
MR. HILL: Yes, the first section of permits generally set out the authorized discharges.
Q And then the monitoring frequency was the page I had referred to earlier, which is page 12.
MR. HILL: The monitoring frequencies, et cetera, would be in section 3 of the permit.
Q And then for Gibraltar, we should go there, as well. The discharge limits are set out at page 2 -- well, it starts at section 1 on page 1, but moves over, the actual table of discharges is on page 2.
MR. HILL: Yes, that section there, 1.1.3 pertains to, specifically to the discharge of effluent to the Fraser River.
Q Okay. How are the conditions of permit determined? So the different parameters that are authorized as discharges and the monitoring requirements, how are those determined? I'll ask that to Mr. Hill.
MR. HILL: Well, generally speaking, the permit discharge parameters would -- that an applicant would apply for would be based on best available

technology numbers that might come from guidelines documents, for instance. Then where would be an assessment of whether or not they can attain or the ambient guidelines. So and then from that process there may be a need to come up with lower numbers to ensure that ambient guidelines are met.

Q Mr. Grace, Mr. Hagen described the mines in the Fraser system that are subject to the ***MMER***. Are there additional mines that you're aware of on the Fraser system? Not mines subject to the ***MMER***, but just other mines?

MR. GRACE: Other mines. There are closed mines.

Q Okay.

MR. GRACE: I don't know of any other actively operating mines.

Q Okay. And Mr. Hagen also answered some questions about whether all the closed and abandoned mines in the Fraser River Watershed are known. Do you have anything to add there, do you have any other information?

MR. GRACE: I suspect there's a lot of mines, closed mines in the province, many of them a hundred years old that we wouldn't be aware of them all.

Q Is it possible they would be discharging into the water system?

MR. GRACE: Possible. We do know of several that we -- that are -- have become concerns that we've dealt with.

Q Okay. And how do you deal with those mines, then, that are closed or abandoned, that are of concern?

MR. GRACE: If they're orphan mines, which means that there's no longer a company that has the -- has liability for the mine, then we would have to carry that all out by the government. If there's still a mining company associated with that mine, then we can approach them to correct matters, do more monitoring, whatever.

Q Okay. Mr. Hagen also talked about Highland Valley Copper. Is -- have you been to that mine site?

MR. GRACE: Many times.

Q And is it the case that there's no discharge?

MR. GRACE: It's -- I guess it depends on your definition of what is a discharge, and Mike would be the expert as far as the ***MMER*** goes. There are several areas of the mine. It's basically an amalgamation of four historical mines, and some of the mining areas are now closed, and they have

discharges of seepage. There is no discharge from the tailings pond directly, but there are seepage systems under the -- below the tailings ponds that are allowed to discharge to the environment, both at the Highmont tailings pond site and the Bethlehem site. But neither of those mining areas are operational -- well, I take it back. The Highmont was closed, but with the increase in copper and moly prices, they actually reopened the two open pits at Highmont, and first they drained them, they were actually making them fishery lakes, and so they drained them, took out the rainbow trout and transplanted them to other water bodies and re-mined the system. So the mine pits themselves are active, but all the milling and tailings pond are in the existing Highland Valley Cooper mill.

Q And are there discharges from that?

MR. GRACE: There are again some seepages allowed to discharge to the Witches Brook and to Dupuis Creek. The issue there was that, I mean, the mine would probably like to collect all that water because it is a water short area, but what that means is then you basically dry up your stream and cause aquatic habitat loss. so we're trying to ensure that relatively good quality water is allowed to go down into that system and maintain flows, maintain the fishery that's in there, or the fish that in there, as well as the moose habitat, wetlands, et cetera.

Q Are the fish that's in that creek sockeye salmon?

MR. GRACE: No. There's a fish barrier many kilometres downstream.

Q Okay. And I guess this question is for Mr. Hill. Does the province have a standard set of parameters like we were looking at with federal regulations that are monitored for every mill or mine, or are they determined on a site-specific basis?

MR. HILL: The monitoring parameters are determined on a site-specific basis.

Q And how do you ensure consistency of environmental protection when you do that on a site-specific basis? What is the -- how do you know you've identified and set the right limits to protect the environment?

MR. HILL: Well, the monitoring parameters would be

generally be broader than just the ones that are regulated. And as was mentioned earlier, when you get metals, you get the entire suite of metals that the lab is able to produce. And then the environmental effects monitoring, biological monitoring toxicity testing will also help to identify if there was some other parameters that might be causing a concern.

Q Do you work with Environment Canada representatives to determine the parameters for the site?

MR. HILL: When an application is made to us, it has been referred to Environment Canada for their input. And if they had some specific additional parameters that they would want to see included in a permit, that would be expected to be a part of the application and we would include that in the permit.

Q And, Mr. Grace, are the provincial biologists like yourself involved in determining parameters in the permits?

MR. GRACE: Yes, that's one of our main jobs when we assess a permit application.

Q And what information do you use in providing that advice?

MR. GRACE: Generally it would -- maybe I should step back a bit. If it's a new mine, it would first have to undergo the environmental assessment process. And as part of that there would be a fairly substantial environmental impact study done before the mine actually is developed. Using that data plus data that the mine would provide on predicting metal levels in any effluents or seepage, we can use that to assess potential impacts from those. And it would also identify metals of concern and other parameters, such as if they use process chemicals, we may want to monitor that, as well.

Q What's done with respect to endocrine-disrupting chemicals from pulp mills?

MR. GRACE: Specifically with endocrine-disrupting compounds, it's not really been something that we've addressed much before. I mean, certainly if they're a metal, then they're caught up in the metal sampling.

Q And if they're not a metal?

MR. GRACE: I don't think it's been addressed up till

now.
Q If a biologist finds a concern in the monitoring data, can recommended changes be made to the permit? Can they recommend changes to the permit?
MR. GRACE: Yes, definitely we assess the reports that are submitted by the mines and their consultants, and as a result of that if there's an issue of, you know, some metal that we think is a problem, we could either change the monitoring program, or alter the permit limits for the discharge, both up, you know, either you're increasing or decreasing.
Q And has that actually happened?
MR. GRACE: Many times.
Q Okay. And what do you do to assess the effectiveness of the permit conditions? We've heard about the environmental effects monitoring that the federal regulatory program is doing. Do you have a similar program in B.C.?
MR. GRACE: Our environmental effects monitoring programs are very site specific. There is some general talk between all the various environmental impacts assessment biologists, but especially with mines there's a lot of complexity and variability in their impacts. The type of ore they're mining, the type of waste rock that they may be in, the type of mill process, and the environment itself can be very different. You could be in a headwater stream, an alpine area, or you could be in a valley bottom where there's, you know, discharge might be to something quite large. There's also some areas where hardness is very low, or in our area, hardness tends to be relatively high. That can impact the impact of -- yes, I've got to use it twice, that can alter the impact of the metals, they tend to be less toxic with higher hardness.
Q So it's done on a site-specific basis. Is there a process similar to what we've heard about as an investigation of cause process that we've heard with the federal regulations, or do you have this reference site and exposed site comparison concept?
MR. GRACE: Yes, we typically try and set up our systems, I mean, environmental effects monitoring is pretty much standard. The best situation is an upstream/downstream situation. If that's not

possible, then you would look at finding a nearby reference site that's as close as possible to what you think an upstream site would be. The other thing, which is also much better, is if you can get a before disturbance and an after disturbance situation, which is called BACI, which is before/after; control/impact type of monitoring program. And that way, if there is a difference between your control and your impact site, you can compare that to the before mine situation where maybe that was something naturally that was occurring and not a part of the mine, or conversely, the two sites, upstream and downstream were very similar before the mine, and now there's a difference. So it makes your assessment much more clear and easier to identify issues.

Q How many mines on the Fraser would have -- would there be that would give you that ability, where you'd have data to say this is what it looked like before, and this is what it looks like now.

MR. GRACE: Well, Highland Valley Copper was developed in the mid-'60s, so that was before our group was even around. So we don't have a lot of pre-discharge data there. The more recent mines we do get a lot of pre-discharge monitoring, used typically as part of the ***Environmental Assessment Act*** process, or even just under exploration. We have several well-developed exploration areas that we actually have permits for, because they have open pits and mine adits, and then have a discharge. So I guess that could be considered a post-mine monitoring, but often they'll -- often the mines now will start monitoring even before they come and talk to us, because they know they have to.

MS. BAKER: All right.

THE COMMISSIONER: We'll take the break, Ms. Baker.

MS. BAKER: Mr. Commissioner, would we be able to come back a little bit early before 2:00 today?

THE COMMISSIONER: I'll aim for ten to. I don't know if I can make that, but I'll aim for that.

MS. BAKER: Okay, thank you.

THE REGISTRAR: This hearing is now adjourned until 1:50.

(PROCEEDINGS ADJOURNED FOR NOON RECESS)
(PROCEEDINGS RECONVENED)

THE REGISTRAR: The hearing is now resumed.
MS. BAKER: Thank you.

EXAMINATION IN CHIEF BY MS. BAKER, continuing:

Q I'll start again with you, Mr. Hill. How often is monitoring data submitted to the province? I should ask you, both mines and mills, if they are the same. If they're different, you can tell us which is which.
MR. HILL: The frequency of reporting generally reflects the frequency that the sampling has to be done. Pulp mill reports in our region are generally submitted monthly and the mines are submitting quarterly.
Q Is there a requirement in permits for mines or mills to report non-compliance where they've done monitoring and they've found that their mill or their mine is not compliant with the permit. Are they required to report specific non-compliance to the Ministry?
MR. HILL: This isn't consistently done, but there are some permits have a clause that requires reporting of non-compliance. That's a new thing that's been incorporated in some of the permits. All the permits would have a clause that requires reporting of emergencies, unauthorized discharges and equipment malfunctions.
Q On the permits that you've negotiated, have you ever included a term that the mine or the mill must report non-compliance?
MR. HILL: Not to date, no.
Q For mines, quarterly results are submitted to the province. That could result in quite a time lag before the province would know there had been exceedence. It could be 60 to 90 days if an exceedence happened early in the quarter. Is that a concern to you?
MR. HILL: Yes, potentially. We get a lot of monitoring reports submitted to us with a lot of data in there, and if it's not brought to our attention, there may be a short lag before a non-compliance is addressed.
Q And why do you have a quarterly reporting for mines and a monthly reporting for mills? Why are mines not reporting on a monthly basis?
MR. HILL: Most of the data collected is on a quarterly

or annual frequency and only some of the data is on a monthly basis for the mines.

Q And why is that?

MR. HILL: Well, it's just generally that receiving environment data for the creeks and the groundwater are monitored at a quarterly frequency and the actual discharge point is monitored more frequently.

Q Okay. Why do you not have a more frequent monitoring requirement for mines, then, in the receiving environment?

MR. HILL: That's just the general practice. I guess it would depend on -- for instance, groundwater would be slower to respond to some kind of input than other sources that you monitor.

Q But the mines would discharge into flowing water as well as groundwater, surface water as well as groundwater.

MR. HILL: Sorry, I couldn't hear what you said.

Q The mines would discharge into surface water in addition to groundwater, right?

MR. HILL: Well, most of the mines don't have a direct discharge. As Bob mentioned, they have maybe non-point discharges, seepage from pits, et cetera, and so they wouldn't all have direct discharges to surface water.

Q They may not all, but certainly mines do discharge into surface water.

MR. HILL: Yes, some do, yeah, and those are covered -- the ones that -- are covered by the metal mine effluence rate.

Q Okay. Wouldn't it be helpful to have those data from those mines reported on a more frequent basis than every quarter?

MR. HILL: I suppose so. I guess we have to start to balance it at some point, where we could have them report daily or we could have them report weekly or -- you know, I guess it's a convenience for staff to get all the data for all the sites submitted in one package. As I mentioned, we do get a lot of data that comes in, and with workloads, it's hard to get through all of that stuff immediately.

There are clauses being developed for reporting of non-compliance and it would be helpful if there was some kind of a provincial-wide policy that gave some direction as to how we

were to deal with developing clauses for reporting of non-compliance. It's so far only been included in some of the more recent permits, and there's a number of different ways that that clause has been drafted, so we haven't landed on one consistent clause for reporting of non-compliance.

Q You heard today about the RISS electronic database for recording monitoring results that the federal government maintains. Were you aware of that database?

MR. HILL: No, not previously.

Q Would that database provide the province with useful information in its work?

MR. HILL: I don't know. I'm not familiar with what's in that database, so I couldn't tell you. We do have a system called EMS that is a repository for monitoring data, and generally the labs that are doing the analysis for the companies are submitting the data straight from the lab to EMS and I believe to the federal system as part of their service that they provide.

Q Does the Ministry keep a record of compliance activities in relation to permits?

MR. HILL: We have a spreadsheet that we use to record when inspections at sites are done, when monitoring report reviews are done, and that's maintained by the Environmental Protection Officers that do that work.

Q And we have an example of that at Tab 33 in the Commission's documents. This is what you're talking about?

MR. HILL: Yes, it is. That would be an example.

MS. BAKER: Could I have that marked, please?

THE REGISTRAR: Exhibit 1037.

EXHIBIT 1037: Compliance Activity Tracking Sheet-Mining (Cariboo Region)

MS. BAKER:

Q And this will record not simply prosecutions but all types of compliance work that is done in relation to permits; is that right?

MR. HILL: Yeah, that's right. It records inspections, so under the column where it says "Activity", there's the "MDR" which is "monitoring data review", and then there's "INS" which is "inspection".

Q This is a question for both Mr. Hagen or Ms. Boyd and the provincial witnesses. What information is shared between the agencies? We've heard today about some discussions on identifying relevant parameters for the permits. What other results are shared, or what other data is shared between the province and the federal government on these two different industries and their effluent discharges?

MR. HILL: Well, I guess I'll go first. In my experience, it's generally the larger reports and the actual data is being reported, as mentioned earlier, to the two separate databases.

Q So when you say the larger reports, would that be like an interpretive report under the Metal Mines Regulation?

MR. HILL: Yeah, the interpretive report or annual reports that -- the mines that aren't covered by MMER that have to submit annual reports under the provincial permit.

Q So annual reports prepared by the province would be shared with Environment Canada, and interpretative reports prepared under the Metal Mine Regs would be shared with the province?

MR. HILL: No, the annual reports are prepared by the permit holder, usually with their own staff or consultants. That's the annual reports I'm referring to.

Q Under the provincial Regs?

MR. HILL: Under the permits.

Q Under the permits, the provincial permits.

MR. HILL: Yes, under the provincial permits.

Q What about enforcement actions? Is that information on enforcement shared between the province and the federal government?

MR. HILL: I can't answer that. The Conservation Officer Service does enforcement for B.C. Ministry of Environment. We do -- we, the Environmental Protection Officers do the inspections and review data. If they're to recommend enforcement action be taken, that would be turned over to the Conservation Officers. I'm not sure how they share information with their counterparts in DFO or Environment Canada.

MS. BOYD: I was just going to add to that. We do actually -- I have been party to where, for pulp and paper issues, if there have been -- there may

be a provincial direction for something, and there may have been federal direction. We have met and exchanged information in sometimes trying to develop a combined strategy, but it is more like the enforcement groups. But we do that, there is sharing of information.

And there is also, for pulp and paper, we do share the interpretative reports, the design reports, the submissions that are given to the mills.

MR. HAGEN: I could also say that permits that are issued will be sent to us generally and we may recommend that some parameters be included or some items be included in the permit. We can offer some feedback on provincial permits, and the province, as a courtesy, may also quote federal regulations in their permits. That was just another method by where the operator may be able to get a better idea of requirements being satisfied for both our levels of requirement.

MR. GRACE: We also have a specific instance where we have multiple dischargers in the Kamloops area, and we got together a group of dischargers and government agencies to share our data, share our work and with DFO, Environment Canada, provincial agencies and local government, municipalities that have discharges, regional district, First Nations and other interested parties.

THE COMMISSIONER: Do I understand in British Columbia, if a party wishes to explore or create a mine or develop a pulp mill, they would essentially have to deal with the province, perhaps Environment Canada, Department of Fisheries and Oceans, and then at the local level as well; is that correct? There's no one-stop shopping in British Columbia for those who are engaging in an activity that might impact upon environmental issues; is that correct?

MR. GRACE: As far as I'm aware, although I know they provincially were trying to -- we've developed a new organization, Forest, Lands and Natural Resources Operations where they're trying to get together almost all of the provincial agencies that deal with that sort of thing, land use. For some reason, environmental protection wasn't included in that, but we still work very closely with all those agencies.

Q You know, these questions are again directed to both sets of witnesses. I'll start with maybe the federal witnesses can answer first. Does the federal EEM address cumulative effects of the introduction of mining and pulp effluents into the freshwater system?

MS. BOYD: The short answer is not yet. I have to say not yet because I'm hopeful. But after pulp and paper, we saw the need to try and consider other discharges, but in enacting the regulations and introducing the environmental effects monitoring, we now start with pulp and paper. We've brought in mining ten years later, and now we're at the stage of introducing municipal wastewater regulations with the intent to include EEM.

So there's potential to be able to go in that direction. I think we can get there, and I think even some of our research scientists and some of academia, in particular one fellow, Dr. Kelly MunKittrick, who was actually part of the original EEM program development, has an idea of how you can move towards cumulative effects monitoring across -- where he's kind of gone from province to province and looking at that aspect. So I think we should go in that direction.

Q In the province, is there any process to assess cumulative effects from mines and mills generally?

MR. GRACE: I don't know if we approach it in quite that way. I mean, we look at all impacts. I don't know if we really think of it as being cumulative as just being the impacts of the mine or the pulp mill. I've never really understood the term. I mean, I understand it in theory, but I don't understand in practice how you'd -- I mean, it seems like any time you monitor, if you're downstream of two discharges, that will be a cumulative impact.

Q Has any work been done by either --

MR. HILL: I was going to add something to what Bob said.

Q Sorry, yes?

MR. HILL: It may be something considered in an environmental assessment process rather than in the individual permits. There is a cooperative federal/provincial trend monitoring stations on the Fraser River that would be able to track changes over time that might be from cumulative

effects.
Q Has any work been done by the province or by Environment Canada to assess these effluent discharges on migratory salmonids? Do you want to start with the federal?
MR. GRACE: Yeah, okay, go ahead.
MS. BOYD: The short answer is no, we have not targeted migratory -- the salmon, just for the very reason that they are migratory and our focus is on the resident fish which we expect would be exposed more than the migratory fish.
Q But you haven't done any assessment to see what happens as migratory fish move through different discharges in their life cycle?
MS. BOYD: Right. No. Not to my knowledge.
Q And the province?
MR. GRACE: Basically the same thing. I mean not only do we not try to look for sockeye or salmon in general because they are migratory, there are a lot of species that are resident that are exposed for their entire life cycle that would be much more likely to be impacted, such as rainbow trout. But even rainbow trout aren't necessarily the best species to monitor because they are also migratory, at least within the freshwater system.
We often look for species that are much more resident territorial and don't tend to move as much, and often looking at sculpins or longnose dace or chub.
MR. HAGEN: If I could add, just in the environmental assessment process for new projects, if there is a potential impact on migratory salmon or there's a potential for a discharge of a new project in salmon-bearing creeks, then that is certainly an issue that would be looked at very seriously and if there are potential high-risk impacts on that resource, it would certainly upset the conclusion drawn during the environmental assessment process for that project.
Q And would such an assessment address the impacts on a migratory fish as it moves through the river and is exposed to different pulp mills through its life, and different mine discharges through its life, and different other effluents through its life cycle, so that sort of not maybe sub-lethal combining effect as it moves through the different discharges? Has that been looked at by

Environment Canada?
MR. HAGEN: No, that is not what we're looking at in environmental effects monitoring. We're looking at particular mines or mills and doing an EEM program. Remember, we're assessing the adequacy of the regulations here, so the presumption would be that a resident fish would be more highly affected by a mill or a mine's effluent.

I can say possibly in the future if those effects are unacceptable on resident fish, then we could certainly move on to look at their impacts on the transient species, but that would be a question of what to do later on, and that's not really been addressed yet.

Q Is there - and this is for the panel at large - is there a way that cumulative impacts could be assessed differently or better to better understand impacts on sockeye in the Fraser system?

MS. BOYD: I think the short answer is yes.

Q Do you have any suggestions in that respect?

MS. BOYD: I guess just even for starters trying to bring some of the different groups working on, like (indiscernible - coughing) organizations and then obviously government, research science, together to try to come up with some kind of a strategy that would do that. I think it's an area that we might have shied away from more just because it's a difficult task to try and do. I think it's just something we've got to move in that direction.

I guess I should add for the environmental effects monitoring, we have actually -- the upper Fraser mills did use juvenile chinook which over-winter in the Fraser and that was, in part, because we were having difficulty in getting the mature large-scale sucker, although it probably didn't work as well as we had hoped, but we did at least try to use that species.

Q Anything the provincial witnesses would like to add to that? No?

MS. BAKER: All right. Thank you. Those are my questions.

Canada is the first up, and Mr. Timberg has indicated that he will try to be done in half an hour. If he can do it any less, that would be great.

MR. TIMBERG: It's Tim Timberg, and my colleague, Hugh MacAulay for Canada. If we could, Mr. Lunn, start with the PPR number 15. I have a series of questions for our witnesses regarding a number of the paragraphs. If we could start with page 6, paragraph 5.

CROSS-EXAMINATION BY MR. TIMBERG:

Q I'm wondering if it's important to - if you have any comment - to clarify the statement in the PPR that:

> ...millions of litres of effluent into the habitats of Fraser River sockeye salmon on a daily basis...

Do we need to clarify that statement?

MS. BOYD: I guess one of the things I just thought would be helpful, would be a bit more context, I think factually it may be correct, millions of litres, point sources, toxics, accumulative -- biocumulative and persistent substances, but I guess given the relative change in discharges, say over a level of 20 years, like for example, significant increases in pulp mill loadings, and from the toxicity perspective now requiring non-accumulative lethal effluent, I just think it would help to have more context.

Also, on a daily basis, the Fraser sockeye wouldn't necessarily be in the river, like they would be like passing through. So it's just context for like versus on a day-to-day basis what the time periods are and some of the relative improvements in the river. I just think it would be helpful.

Q Okay. Mr. Hagen?

MR. HAGEN: I think, yes, I've got maybe four points that might be helpful. With respect to effluent discharges in general here, one of them might be is that some discussion in the PPR and the technical report for that talking about the amount of effluent that is discharged from mines, and the numbers reported there are generally the permit maximum and I'd just like to point out that very often the actual discharge from the mine is considerably lower than what they may be permitted

to discharge. So that means you keep in mind it's quite often that a mine needs the water and they recycle that water from their tailings ponds back to the mill and they use that water in their process. So in fact Highland Valley Copper does not have a discharge because they're using that water, so supernatant water may be actually quite a bit less than they're permitted to discharge.

I just wanted to mention Gibralter's discharge is actually an intermittent one. They do not charge (sic) between November and April during the winter low flow. That may be something that the province can speak to as a management action to try to manage that effluent discharge for more favourable environmental impact.

Also we had some discussion about the Highland Valley Copper, whether they had an effluent discharge or not. I just want to clarify one of the reasons for the apparent discrepancy between provincial recognizing discharges and federally. We do not -- the MMER have very explicit definitions of what effluent is, and if the effluent, for example, is emanating from a closed part of the operations area, which was closed when the MMER was promulogated in 2002, then we would not consider that an effluent so that could explain discharges from the closed Bethlehem pit or Highmont pit's tailing pond. They're not effluent under the MMER.

Also we may have a situation such as Highland Valley Copper. I'm not sure if they're actually discharging their aquifer water, dewatering around the pit, but they're not doing that -- they're talking now that they -- a possibility a mine is entitled -- in fact we prefer them to discharge or divert clean water around their operations area, so that water does not enter into the operations area and that water would be a clean water diversion and is not an effluent.

So there's a couple of items like that here.

Q Thank you. Mr. Gill or Mr. Grace, did you have anything to add to that? You were lobbed a few questions there.

MR. HILL: Well, just one thing that maybe I could add to that is perhaps, in terms of context, what's needed is an inventory of the actual discharges of the different contaminants of concern from the

different sources and what proportion of the concentration of those substances, those discharges represent in the river.

Otherwise, the comment there in number 5 and number 6 there, you know, are fairly generic otherwise.

Q Okay. Thank you. If we could then move to page 11 to paragraph 18. Ms. Boyd or Mr. Hagen, do you agree with the statement that s. 36(3) does not oblige DFO or Environment Canada to take any positive steps?

MS. BOYD: I guess just it would be useful to clarify that it could be argued that not depositing a deleterious substance into waters frequented by fish in itself is a positive step. Also, before you get to prosecuting, there are tools that the enforcement officers have available to them that can work to bring a discharge or a facility into compliance before going to prosecution. So I just wanted to bring out those. I think those are useful to include.

Q Okay, thank you. Mr. Hagan, are you satisfied?

If we could then move to page 65, paragraph 176. The question here is does this description accurately reflect how the Department of Fisheries and Oceans, Environment Canada and Health Canada work together on dioxin and furan monitoring?

MR. HAGEN: Yeah, just to clarify how this is actually working at that time, we have three agencies each with their own mandate to deal with various parts of this issue. So we work cooperatively in this program. So it was actually Health Canada that would review the data that was collected.

The data that was collected on dioxin and furan levels in fish and sediment, Environment Canada had the mandate to issue directives to require the operators to collect that information. That information would be sent to DFO who would get a health assessment recommendation from Health Canada regarding the significance of those levels, whether they're a danger to human health or not.

Then under their mandate, DFO could issue a closer or a health advisory or whatnot for a particular area. So our three agencies have separate issues or separate mandates that we could bring into play on this and cooperatively try to manage that issue.

Q Thank you. If we could then move to page 70, paragraph 193. Is this statement --
MS. BOYD: Oh, I think this one has been corrected. This was the --
Q I just wanted to clarify if this -- did we correct that this morning?
MS. BAKER: No, I forgot to change that one.
MR. TIMBERG: Okay.
Q So could you comment on the statement that there are 139 coastal B.C. pulp and paper mills. Should that read 10?
MS. BOYD: In that period if should be 10.
Q So it should not read 139 mills, it should be 10 mills.
MS. BOYD: No. That might just have been confused with -- it's probably roughly the number of mills in Canada. It's just a typo, okay.
Q Thank you. And if we could look at paragraph 196. Does the effluent testing focus only on acute toxicity?
MS. BOYD: For pulp mills?
Q Or tend to focus primarily on acute toxicity.
MS. BOYD: For environmental effects monitoring, it's got sub-lethal toxicity testing included as well. So for the non-EEM part, it's on acute toxicity using rainbow trout, 96L or LC50 (sic) and daphnia magna toxicity test, but for sub-lethal -- for environmental effects monitoring, it's got the sub-lethal toxicity testing.
Q Okay.
MS. BOYD: It's conducted twice a year as Wendy had noted this morning.
Q Thank you. If I could then move to page 75, paragraph 203. Mr. Hagen, does the Huckleberry mine discharge to the Fraser River basin?
MR. HAGEN: I'll just clarify this. The Huckleberry mine discharging to Tahtsa Reach on the Nechako Reservoir and of course the Nechako Reservoir had two discharge points to the Kemano Diversion and through the area on the east side. So Huckleberry mine discharges to Tahtsa Reach and the flow in that Reach is primarily towards Kemano. So I don't know that you would be able to say that there would be much of Huckleberry on the Fraser River.
It's kind of a grey area when you've got two discharge points there now.

Q Thank you. If we could then turn to page 79, paragraph 217. Mr. Hagen, do we need to clarify anything about the comments here about the tailings pond and how it's described here?

MR. HAGEN: Okay. We talked about this and I can't quite remember what we wanted to clarify. I think I addressed that already. Supernatant discharge from a tailings impoundment may not be as much of that water as you might anticipate, because we've got three cycles back to the mill.

Q Okay. Thank you. And then paragraph 273 at page 102. Do we need to clarify the statements in this paragraph with respect EEM programs, biological monitoring and their requirements?

MR. HAGEN: We just wanted to clarify that the requirement for a fish survey is present in all mine and all mills environmentally-set monitoring programs. There is an exemption that is available from mines or mills whose effluent is less than one percent concentration in the environment within 250 metres of their final effluent discharge point.

What that means is that beyond the 250-metre distance, if effluent was less than one percent, then a fish survey exemption can be granted. This is essentially because the difficulty of conducting a fish survey in such a small area when fish are transient or mobile, in and out of a plume that's that small, the presumption is that there would be no effect when the plume is so small.

But for most mines, for example, very few mines would have an effluent dilution zone of one percent that is less than 250 metres. Gibraltar is one of them.

Q Thank you. And then my last question with respect to the PPR is at paragraph 266, just a bit above at page 100. This paragraph lists three conditions that are required, and are there other conditions or comments that should be added to help clarify this paragraph?

MR. HAGEN: We just wanted to clarify that the conducting of an environmentally-set monitoring program is a condition of deposit within the regulations, both PPER and MMER.

Q Thank you. And if we could just turn to page 74 of the PPR, there's a map there that may help us

with this next conversation. Mr. Hagen, earlier this morning, there was a discussion about the knowledge that exists regarding historic mines that are now closed.

What is your confidence with respect to the knowledge of the location of closed mines?

MR. HAGEN: Yes. I would like to clarify that. There's a fair bit known about closed mines in British Columbia. The Ministry of Mines in particular have the database called MINFILE which is an excellent resource for looking at which mines have operated in the past. It goes back over 100 years. There's quite a number of projects listed in there.

I personally am familiar with that. There are least -- there are 15 closed mines that processed more than 100,000 tonnes of material in the Fraser Basin. We would expect that the larger operations would probably have some more significant impact, or potentially more significant impact. But we looked at the larger operations, 15 greater than 100,000 tonnes in material processed during their lifetime. I'm also aware there's at least 12 more that processed 5,000 tonnes or more.

When it comes down to the much smaller operations, lower than that, this is something that very likely -- the information about that is likely in MINFILE. It can be found, but I don't have it at my fingertips so to speak.

Regarding closed mines, I would like to mention most of these mines we're familiar with. We know that they don't have an impact, or they do have an impact (indiscernible - overlapping voices) --

Q Are there any concerns about mines that are closed, or do you have any specific mines that --

MR. HAGEN: These are mines that are closed.

Q Right.

MR. HAGEN: For example, the Samatosum mine north of Kamloops, that was a very small open pit mine that operated for a couple of years without a discharge. Subsequent to its closure, it generated some small acid rock drainage which is under active management right now. That's about the only closed mine that I'm aware of in the Fraser Basin that has a problem that is being

managed.
Q Okay. Thank you. Are there any significant new mines or new projects on the horizon that may affect the Fraser Basin?
MR. HAGEN: Yes, we have a number of new projects that are either in the EA process or in pre-application. Some of these are quite large. We mentioned the closed open pit copper mine, the Kamloops, New Afton, or Afton and Ajax, they're both in development to re-open and operate again. New Afton, I think is very close to operating. They've got all their permits and certificates needed to operate an underground mine in the old pit. The Ajax mine is just starting into the EA pre-application process.
Another project is Harper Creek which is north of Kamloops and that would be a fairly large open pit operation that will be entering the EA process shortly.
Q Okay.
MR. HAGEN: Chumahli -- Chumahli (phonetic) be a mine southeast of Prince George is another fairly large mine that will be --
Q Mr. Hagen, so -- Mr. Hagen? Oh, he can't hear me. Mr. Hagen, so then as we've just discussed earlier those new mines that are coming on, they'll be going through an environmental assessment process; that's fair to say?
MR. HAGEN: Yeah, they will be going through an environmental assessment process.
Q Okay. Can you comment on placer mines and provide us with a definition of that and whether they're covered under the MMER?
MR. HAGEN: Okay. Placer mine operations are essentially operations that will process river bed sediment, fluvial sediments and filter out grains of gold, usually, from that sediment.
Under the MMER they are not considered mines, and we don't usually deal with placer operations in my section, but I would like to point out that some of these placer operations may have a very significant impact on the environment. Certainly historically that would have been the case.
Q Are there instances when a placer mine could be covered by the MMER?
MR. HAGEN: In the instance where a placer mine, for example, brings in a backhoe and starts to

evacuate bedrock and process that bedrock as ore, then it would actually come into the definition of an MMER mine.

Q Thank you. And do you have any knowledge about the location of these placer mines in the Fraser River Basin?

MR. HAGEN: Only generally. The central area for placer operations now is probably the Quesnel River and also the Lightning Creek area downstream of the Barkerville/Wells area.

Q Thank you. And if we could then turn to a document from Tab 9 that was entered this morning as Exhibit 1034. This is the national assessment of phase 1 data regarding metal mining. If we could turn to page 12 and 13 at the same time.

MR. LUNN: And that's on the paper pages?

MR. TIMBERG: Oh, yes. Yes, that's that page and then, yes, if we could go sideways, that would be great.

Q So this morning, Mr. Hagen, there was conversation about an overall conclusion of some inhibatory effects on fish from metal mining. I'd like you to comment on the two graphs here with respect to results of pulp and paper, as I understand the one page, and the other one being -- yeah, so the one there, this is the -- on the right we have the results of the pulp and paper studies, and on the left, we have the result of the metal mine studies with respect to impact on fish.

With those two figures up, could you explain the relationship between these two graphs?

MR. HAGEN: Yes, we thought these two diagrams here would be a very helpful way of viewing what the overall national assessment conclusions are when we talked about national assessment reports. So if you look at the diagrams, you'll see a vertical line in the middle above zero there on the horizontal axis. If the horizontal lines, one for each parameter -- if those horizontal lines intersect the vertical line, then the conclusion would be no effect on that parameter, generally speaking, of the national perspective.

So if you look at Figure -- well, pulp and paper first, because we talked about that first -- Figure 5. We talked about a general stimulator effect on fish, and you can see that on condition, liver, weight at age, and age on the diagram are to the positive side on the right side of that

vertical line. We talked about an inhibitory effect on gonad size and again, that vertical line for gonad is on the negative or the left side of that vertical line.

So if you look at Figure 4, for three of those fish parameters, the horizontal line intersects the vertical line at zero, so we conclude, generally speaking, no effect on a national basis.

And for the record, the condition is to the left so we've got an inhibitory effect on fish from mining and it's interesting that the direction is opposite for fish versus pulp and paper.

Q Right. And Figure 4 is for metal mines and Figure 5 is for pulp and paper. Is there any -- can we learn anything about these two graphs as to a cumulative impact analysis?

MR. HAGEN: I think what they do tend to do is illustrate how challenging it would be to do a cumulative effect assessment. If you're bringing in pulp and paper where you've got inhibitor -- or stimulation versus metal mining, you've got inhibition. Then you start asking what is the effect if you've got these combined, is there an added effect or synergetic effect or antagonistic effect.

Then thirdly, if you start considering the other discharges that are present in the basin from urban effect, agriculture and municipal wastewaters, I think it illustrates that cumulative effect is a real challenge to do.

MR. TIMBERG: Thank you. If we could then move to -- in the interests of time, I'll keep moving on that conversation. If we could go, then, to exhibit 2 of Canada's binder of documents. It's a 2002 document on clean safe water.

Ms. Boyd, can you identify this document for us and explain whether this is a helpful document for us to understand the work of the pulp and paper -- regarding the pulp and paper industry.

MS. BOYD: The short answer is I guess it just gives a quick summary after ten years of pulp and paper being in place and - sorry - the pulp and paper effluent regulations being in place, the updated ones plus the two ***CEPA*** regulations which are also listed on that document. It just gives a quick

snapshot that I think is effective just to see the degree to which the mill effluent was improved. It doesn't mean that we don't have room to go from there, but I think it's good to show kind of the relative change in those effluents.

MR. TIMBERG: Okay, thank you. If that could be marked as the next exhibit.

THE REGISTRAR: Exhibit 1038.

EXHIBIT 1038: Clean, Safe Water-Implementing Sustainable Practices in the Pulp and Paper Industry, A 10-year Path to Success

MR. TIMBERG:

Q And, Ms. Boyd, earlier and just now we spoke about studies being done on resident fish. Just for clarity of the record, has there been any work done on sockeye salmon as a resident fish?

MS. BOYD: Not as a resident fish for EEM because it is, to us, not considered a resident.

Q Right.

MS. BOYD: It's just ones there, you know, essentially exposed to the effluent on a daily basis is what we're targeting for EEM.

Q Right. And then, in your opinion, does the pulp and paper effluent today have an impact on Fraser River sockeye salmon?

MS. BOYD: The short answer is that we don't know because we don't design our studies for sockeye salmon specifically, but I guess the intent is that if we looked at resident species, that could be used to compare with a species that's moving through. So I guess we would consider they would be less likely to be affected by it because of that, being transient.

Q All right.

MS. BOYD: Migrating transient.

Q And if we could then move to document Tab 13 from the Commission's list that was marked this morning as Exhibit 1030. This is a study of the upper Fraser River environmental effects.

Ms. Boyd, is this perhaps the best data that we have on the upper Fraser River before us, this paper?

MS. BOYD: Well, I guess I referred to that in terms of the effects, results in discussions this morning. Primarily because those are the largest mills on

the river.
Q Sorry, I'm aiming to move through my -- I've got a short period of time.
MS. BOYD: Yeah, yeah.
Q If we could move to page 21 of 161, and if we could look at this tab, Figure 2.2, can you describe for the benefit of the Commissioner what this figure tells us?
MS. BOYD: Well, I guess it's just a useful document to just see what happened with -- this is just an example of the Canfor Northwood mill and to show how the changes in the loadings were effected by the regulations coming in. If you see in kind of a 1982 era, there was a sharp increase in your suspended solids and biochemical oxygen demand and that was actually the mill had an increase in production. They had a major expansion.

But then when the regulations came into place in 1992, the mill had actually started to ramp up for those regulations and you can see where the AOX, which can simulate the dioxins and furans as well, but the sharp decrease from the regulations in place, actually federal and provincial, and also for the BOD and TSS. I just thought it was something that quickly capture the scenario for the changes in the regulation.
Q Thank you. If we could then move to Tab 10 of Canada's list of documents. This is a map -- and Ms. Boyd, do you know who created this map?
MS. BOYD: Well, Mike originally created the map and I just keep changing it as mills change or the status changes. But it's a useful summary of the pulp mills in B.C. It shows the current names and it shows the status of some of the closed mills that are no longer PPR mills, and it updates the Colodey, et al, 1999, which is -- I forget which number it is on our documents. But the short of it is an update to current mill names and status.
MR. TIMBERG: Thank you. If this could be marked as the next exhibit.
THE REGISTRAR: Exhibit 1039.

EXHIBIT 1039: BC Pulp and Paper Mills Maps - Update to Figures 1 and 2 in Colodey et al 1999, June 2011

MR. TIMBERG: If we could then have, Mr. Lunn, a

document marked this morning from Tab 15 of the Commission's documents, Exhibit 1026 brought up.

Q There was a discussion regarding the abstract at Roman numeral (iii) and a conversation ensured with the word "eutrophication" being raised. I'm wondering if we can just have a definition of what eutrophication is.

MS. BOYD: I guess the short answer is just it's a gradual nutrient enrichment of an area, so it starts as oligotrophic and then gradually as nutrients are added to the system, either naturally or man-made contributions, it becomes nutrient-enriched or eutrophic is the term.

MR. TIMBERG: Thank you. Those are all my questions.

MR. BAKER: Thank you. Ms. Rowbotham for the province is next. She thinks she can finish in 20 minutes.

MS. ROWBOTHAM: Thank you. I'm Elizabeth Rowbotham for the province and here's my colleague, Boris Tyzuk. I have a few questions.

CROSS-EXAMINATION BY MS. ROWBOTHAM:

Q The first question, I'd like to go to PPR-15, please, paragraph 65.

So, Mr. Hill, perhaps you can help me out here. They say that, at paragraph 65:

> In July 2004, the Environmental Management Act ("EMA")...came into force. It combined the former ***Waste Management Act*** and the former ***Environment Management Act*** to create a single statute governing environmental protection and management in the Province.

In your view, is that correct or are there other statutes and regulations governing environment?

MR. HILL: Yeah, there are other statutes that deal with environmental matters such as ***Water Act***, ***Fish Protection Act***, aspects of the ***Mines Act***. Those would be some examples.

Q Right. Thank you. With respect to paragraph 66, the first sentence says that:

> The ***EMA*** is less prescriptive than the former ***Waste Management Act***.

Do you think that's correct, or is it differently

prescriptive than the former ***Waste Management Act***?

MR. HILL: I'm not exactly sure what's intended by "prescriptive", but I could describe the change that happened when there was a switch from the ***Waste Management Act*** to the ***Environmental Management Act*** in that that was previously all waste discharges could not happen without a permit from any type of business. Under the ***Environmental Management Act*** there was a regulation called the "Waste Discharge Regulation" where different types of business were prescribed along with some activities, particular types of activities were prescribed for which discharges were prohibited without a permit.

But there still remained a general provision not to cause pollution whether you were prescribed or not.

Q Thank you, Mr. Hill. And if we can go to paragraph 70. Paragraph 70, it says that there is no permit requirement:

> No site-specific permit or other waste discharge authorization is required for...

Activities, industries listed in Schedule 2. And just for clarification, that presumes that there's a code of practice in place, correct?

MR. HILL: Yes. If an activity or a business is prescribed in Schedule 2, they may not discharge without a permit or, in the alternative, if there's a code of practice, they would register and discharge under authority of that code of practice.

Q Okay. Thank you. And I think at footnote 145, the footnote states that:

> A person is exempt from subsections 6(2) and 6(3) of the ***Act*** in relation to the discharge to the environment of coarse coal refuse, waste rock or overburden...

An effluent permit would still be required in those circumstances; is that correct?

MR. HILL: Yes, and that provision existed as well under the ***Waste Management Act*** regime. This particular exemption just deals with the rock dump piles, the rock itself. But if there was effluent

coming from that rock pile that was being collected and released, then the requirements to get a permit would still apply. The exemption is just for the rock itself.

Q Thank you. And if we could turn to paragraph 288 of the PPR, please. It states here, paragraph 288 that:

> Environment Canada observed in 2008 that the provincial Ministry of Environment "has significantly reduced its inspections of mines, so it is no longer possible to conduct coordinated site inspections."

Would you agree that the province has significantly reduced its inspection of mines?

MR. HILL: In my experience in dealing with mines from approximately late '90s to present, in the Cariboo region we've maintained a fairly constant frequency of inspections of the mines.

Q Thank you. My next question is still within the PPR but it's paragraph 7. Mr. Grace, if you could help me out here. I'll take you to the last sentence of that paragraph. It states:

> Municipal wastewater effluents are also a source of...PBDEs, which are used as fire retardant.

Is it more correct to say that municipal waste water may be a transport mechanism rather than a source?

MR. GRACE: Well, you're getting into definition there. I mean, basically, PBDEs are found in most combustible materials including in this room. They tend to be very widespread. It's not something that's put in there intentionally as in bodily waste, but it does get in there 'cause it just comes from everything, laundry, computer screens.

Q Okay. Thank you. Mr. Hill, when dealing with non-compliance issues with respect to permits, is there a provincial regulatory requirement to report all non-compliances or certain types of non-compliances?

MR. HILL: Well, there is the spill reporting regulation which requires that spills or any

unauthorized releases exceeding certain thresholds must be reported in accordance with procedures in that regulation.

Q So it may not be put out in a permit that all exceedences, all non-compliance issues have to be reported because the regulation will capture some of the more significant ones that will have significant short-term environmental effects.

MR. HILL: Yeah, the regulation would capture significant unauthorized releases to the environment and those would have to be reported immediately.

Q And the consequences of failure to report those types of instances?

MR. HILL: That's a violation. I can't quote you the section, but it is a violation that we have on occasion pursued.

Q It is considered an offence not to report in those circumstances?

MR. HILL: That is correct.

MS. ROWBOTHAM: Mr. Lunn, if you could take me to the province's document. This document is entitled "Review of the Thompson River Partnership Monitoring Program".

Q Mr. Grace, are you familiar with this document?

MR. GRACE: Yes, I am.

Q Can you provide me with a bit of background with respect to this document?

MR. GRACE: Basically in 2003, the various agencies and dischargers who are required to monitor the Thompson River got together to combine and integrate their monitoring so that they could take advantage of not having to duplicate sampling at the same place or times, same parameters, that they could integrate their programs so that they could do the same thing and maybe free up some money to look at other issues.

The program was for six years. It was partially part of the federal EEM process, but also part of the city of Kamloops Liquid Waste Management Plan. The original plan was to do three years of monitoring before they changed to the new city sewage treatment plant.

The plant wasn't built, although it's currently in the process of being constructed. So after the three years, we altered their discharge to mimic what would happen after their new sewage

plant would be in force, and carried on for the other three years.

So in 2010, we wanted to see -- that was the end of that part of the program, so we wanted to see, well, where should we go from here? We thought that it would be good to have outside experts assess our program and report out on it and make recommendations. So this report is the result of that assessment.

Q And from this report there were recommendations made and are in the process of being considered?

MR. GRACE: Yes, we have an annual meeting, but we had an extra meeting in the spring to go over the report with all the various partners and discuss all the recommendations in the report and whether they -- it would be nice to do, should do, will do. Also we need to coordinate all the various monitoring partners as to what parts of the program they would be doing, and also, because there is money freed up, we also want to look at new upcoming issues. In fact, there is discussion about looking at merging contaminants and EDCs.

Q And is participation in this group voluntary?

MR. GRACE: Well, pretty much. We do have control over the permittees, but we haven't actually told them they must come and be part of this program. I think it's just something that everybody recognizes is a really good thing to do, and they come there voluntarily.

Q And can you remind us who the participants are?

MR. GRACE: Well, there's the Domtar Pulp Mill, the City of Kamloops Sewage -- well, the City of Kamloops in general, mostly because of their sewage plan, Kamloops Indian Band, DFO, Environment Canada, the Thompson-Nicola Regional District, Village of Ashcroft due they both drink the water from the Thompson and discharge their sewage to it, Cook's Ferry Indian Band, Skeetchestn Indian Band.

MS. ROWBOTHAM: Thank you. May I have this marked as an exhibit, please?

THE REGISTRAR: Exhibit 1039 (sic).

EXHIBIT 1040: Holmes, Review of Thompson River Partnership Monitoring Report, Nov 30 2010

MS. ROWBOTHAM: May I just consult with my colleague a moment? Those are my questions.
THE REGISTRAR: Oh, I'm sorry, that would be Exhibit 1040.
MS. ROWBOTHAM: Thank you.
THE COMMISSIONER: 1040?
THE REGISTRAR: That's right.
MS. BAKER: Thank you. Mr. Commissioner, if we're taking an afternoon break, maybe we would want to start now and come back with Mr. Leadem at five after?
THE COMMISSIONER: All right.
MS. BAKER: Would that be okay?
THE REGISTRAR: The hearing will now recess until five after.

(PROCEEDINGS ADJOURNED FOR AFTERNOON RECESS)
(PROCEEDINGS RECONVENED)

THE REGISTRAR: Order. The hearing is now resumed.
THE COMMISSIONER: Mr. Leadem.
MR. LEADEM: Good afternoon, Mr. Commissioner. For the record, my name is Tim Leadem. I act as counsel for the Conservation Coalition, a group of environmental groups. And you know that you're in the home stretch when I usually show up and then my colleague, Anja Brown, for the First Nations Coalition, will come after me.
Mr. Commissioner, I've been assigned, I think I've got 35 minutes, and I certainly hope to complete within that timeframe.

CROSS-EXAMINATION BY MR. LEADEM:

Q I'm going to take a wild stab here and ask you a question that aside from your being together on this panel, it's very likely that all four of you have had very little to do with one another over the years; is that a fair statement? Do you meet regularly to talk about things?
MR. GRACE: I can't talk for Doug, but Janice and I meet at least once a year face-to-face and probably talk on the phone a dozen to 20 times a year.
Q That's good. How about yourself, Mr. Hill?
MR. HILL: Well, I've met both of the federal folks here, I don't know, probably at least 10 years

ago. I don't see them all that often, because the kind of work I do doesn't have as much contact with them as, for instance, maybe the enforcement people in their group or the people in their group that deal with permits.

Q Do you actually have formalized meetings where you get together and discuss areas of common interest from time to time?

MR. HAGEN: Well, in terms of metal mining, yeah, we do have a local monitoring committee, and Bob would have been on that committee. If we had mines in the Kamloops area then we would have been interacting that way. But generally speaking, I have very good working relationships with my provincial colleagues in different regions of the province, and if I haven't interacted so much with the Cariboo or with the southern regional people, it's because there haven't been as many mines in that area.

Q And Ms. Boyd?

MS. BOYD: I was just going to add to that, because when you said that I kind of had a kind of a flash from the past. I think we used to do it more. I mean, we certainly, you know, with environmental effects monitoring the area, or even just the other side of the pulp and paper, we will get together, particularly for working on a particular mill or issue.

But we used to, as agencies, I do recall times where there were gatherings where you would go through like a series of issues. I don't know if a part of that might have changed with, you know, we went through a large restructuring the last few years and that might have just interrupted it, but it could be something we get back to.

Q So would you all agree that it would be a good thing for you to meet regularly in a formalized way to talk about issues of common concern with respect to the industries that you're regulating? Would that be something that would be worthwhile?

MR. HAGEN: Well, I think, as a general statement, we can say if there are issues to meet about then we meet, and we do have extensive discussions with each other if there are things to talk about.

Q Okay. I'm going to move on and talk about Fraser River sockeye, specifically with respect to the

issues that bring you to this panel, and I'm going to begin my discussion by examining with you Exhibit 833 that's been marked in these proceedings. And this is a federal document, it's entitled, Late-run Sockeye at Risk: An Overview of Environmental Contaminants in Fraser River Salmon Habitat, and it's authored by Drs. D.I. Johannessen and P.S. Ross.

Are either of the federal representatives familiar with either of these two gentlemen?

MS. BOYD: I know the second author; I'm not familiar with the first author.

Q All right. Peter Ross is --

MS. BOYD: Peter Ross.

Q -- is with Oceans Canada, I believe, and operates out of Sydney.

MS. BOYD: He's with Oceans Canada, or I believe he's with Oceans Sciences.

Q Okay. I'm going to ask you, and hopefully you've had a chance to look at this, because it was one of the documents that Commission Counsel suggested that they might have you examine. If I could ask you to turn to page 21 of the document, Mr. Lunn. I think it's 33 on the pdf.

MR. LUNN: Thank you.

MR. LEADEM:

Q And there's a discussion, a short discussion under 3.3 Pulp and Paper Mills, and I want to continue -- the authors spent some time to talk about the number of mills and their locations, and then continued on to the next page - if you could just scroll it down slowly - there's a paragraph that says:

> All of the B.C. pulp mills fall under federal legislation, which does not allow the release of acutely toxic effluent and more recently has severely restricted allowable dioxin and furan releases.

And we talked a bit about that earlier in your evidence. And then it goes, after the bulleted items, about all of the good things that have happened as a result of regulation to the pulp and paper industry. It says:

> Despite these significant improvements, there

are still concerns about contaminants in pulp mill effluent.

It goes on to say:

> The general toxicity test of the effluent is for acute toxicity only, and does not test for sublethal effects or chronic exposures.

So let me just stop there. This paper was authored in 2002. Has that changed considerably since that time, Ms. Boyd?

MS. BOYD: I guess the short of it is we had sublethal toxicity testing in the environmental effects monitoring program from the start of the -- when the EEM was introduced in 1992. So we have had sublethal toxicity testing in pulp mills since then.

Q So there's some, but not, generally speaking, a lot, is there?

MS. BOYD: Twice a year three tests, plus the two acute tests in the --

Q The authors of this paper go on to suggest that:

> ...while a number of the water quality parameters are improved by the changes and a number of well known contaminants are significantly removed, there are a large number of contaminants which are of more recent concern and their response to mill procedure changes is not well understood.

And then they go on to talk about:

> Endocrine disruption is one of the major known sublethal effects of pulp mill effluent and may result from a combination of endocrine disrupting compounds (EDCs) in the effluent such as natural plant hormones, heavy metals, chlorinated compounds, and surfactants such as the alkylphenol ethoxylates...

Do you agree with that statement, Ms. Boyd or Mr. Hagen, or any member of the panel?

MS. BOYD: I would say that we, through our Environment Canada researchers are also with academics and

some east coast -- DFO on the east coast. Maybe DFO on this coast as well. But, you know, we have recognized that there are still effects in pulp mill effluent, and so we're still looking at what the potential causes are, and I'd identified this morning one study, for example, that where there is -- they're looking at the reduced gonads size in the fish, which is -- and that's an associated effect of endocrine disrupting chemicals.

So within that study they're looking at endocrine disrupting chemicals. I don't know exactly which ones relative to what is listed here, but the author there, Hewitt and Servos, Mark Hewitt is one of the heads of that larger joint study.

Q That's the first paper, that's the Hewitt and Servos paper that you recognize?

MS. BOYD: Yes. I just recognize like the name Hewitt, Mark Hewitt, and he is one of the people leading the study.

Q So it goes on to say that:

> Research has demonstrated a decline in the concentrations of a large number of endocrine disrupter compounds after secondary treatment of the pulp mill effluent.

Do you know whether the pulp mills that you've described in B.C. have secondary treatment?

MS. BOYD: Yes, they do.

Q All of them?

MS. BOYD: Every mill -- pretty much the 1992 regs effectively made almost all mills go to secondary treatments, but there are like, I think, one or two, like the Kruger tissue mill has a treatment and a process such that their acute lethality, their BOD and TSS are under the limit prescribed.

Q The authors go on to say:

> ...the study did not analyse for the degradates of the chemicals tested. The overall endocrine disrupting nature of the effluent was therefore not comprehensively evaluated.

So are you familiar with the fact that these endocrine disrupters degrade and that it could be

the degradates that actually can be disruptive of the endocrine system?

MS. BOYD: I'm probably not a good one to ask about that, but I would say, just based on where they're going with this larger joint study, for example, not to mention other research, that they're looking at those kinds of chemicals.

Q Okay. I want to now turn from that document to another document. It's document number 1 from the Conservation Coalition's documents, Mr. Lunn.

MR. LUNN: Thank you.

MR. LEADEM:

Q And hopefully you will recognize this document, because it's a Health Canada document. Do you recognize this document, Ms. Boyd or Mr. Hagen?

MS. BOYD: I was going to say I recognize it because I was on the list, but I don't -- I can't remember if I've seen it and I wasn't sure what the date was --

Q Right.

MS. BOYD: -- because some of the phrases suggested it was probably a few years back.

Q Okay. I pulled this off the website, so the date in the upper left corner is the date I pulled it off the website.

MS. BOYD: Right.

Q So it would be June the 7th of 2011. So I take it from that, that it's current as of that date.

MS. BOYD: Oh. I'm just trying to remember where I read that it suggested like recently regulations in place and our pulp mill and our PPER and two ***CEPA*** regs were in place in 1992, so that's what my thinking -- and again, I can't tell if I've seen it before, but if I have, it would have been a long time ago. So that's why I'm just thinking it might have been an older document.

Q Okay.

MS. BOYD: I don't know.

Q Well, let's see what we can draw from the document. If I could ask you, through the benefit of Mr. Lunn, to examine page 20 out of 27 , Mr. Lunn. There's a heading, 4.9.2 Chronic Effects, and I find these words:

> Unlike acute lethality, chronic toxicity normally does not result in the immediate death of an organism upon exposure to a

pollutant.

And then it carries on and there's a general discussion about chronic effects. It says:

> Chronic effects typically develop after continuous, longterm exposure to low doses of toxic material. In many instances, the effects a pollutant may exert on the individual organism, although subtle, may be important to the continuance of the species, e.g., reproduction, growth, or survival.

Do you agree with that statement, generally, Ms. Boyd or Mr. Hagen?

MS. BOYD: Go ahead.

Q Just a general statement about chronic effects.

MR. HAGEN: I'm just reading over what you said just here. Well, if you're referring to the difference between acute lethality and chronic toxicity, then yes, there's the well accepted difference there. Acute lethality test will test if a species, the test organism, will die on exposure. Chronic toxicity normally looks at other effects, reproduction or growth, and attempts to see if exposure to a compound will inhibit that ability to grow or reproduce. So you don't have a death end point in any chronic test.

Q And if you follow through, the authors of this Health Canada paper go on to describe some of the chronic effects, and I'm just going to ask you to agree or disagree with whether these are chronic sublethal effects. The first one they've got there is reproductive and life-cycle effects. Is that something that you recognize as a chronic effect or potential chronic effect caused by effluent from a pulp mill?

MR. HAGEN: Generally speaking, if you're talking about an inhibition of some life studies -- life stage or an effect on growth, an effect on reproduction, then that's a chronic effect, yes.

Q Right. And then carrying on in the paper, the next bold heading is Biochemical and Physiological Changes. These are something that you're familiar with as being a potential chronic sublethal effect, liver enzymes, liver damage? There's a whole raft of papers that are here. And if you

can just scroll through very slowly, you can see a number of studies this document makes mention of.

So would you agree that physiological and biochemical effects are potentially sublethal effects and chronic effects that may be found from pulp mill effluent?

MR. HAGEN: Do you want to take that one?

MS. BOYD: I guess I was actually trying to look for where the references were, but I guess it's only on before -- it's only on mine. But I guess the short of it is, I mean, we recognize, for example, in the environmental effects monitoring that we have been doing, that we have seen effects, I guess you could call it chronic in that the -- I mean, well, I was going to debate the word "chronic", because the point is that we have identified effects. We are now looking towards identifying the cause and solution. So in that sense, I wouldn't say they're necessarily chronic, because we're working towards a solution. So I guess I would shift -- I would say that in the processes we've gone through for -- starting with pulp and paper and in implementing the environmental effects monitoring program, that we're working towards solutions where we do see effects.

Q All right. Well, certainly it's chronic from the aspect of the fish, would it not be? It's a chronic effect upon the fish? It's something that happens over the course of time. That's what I take to be the genesis of the word "chronic".

MS. BOYD: That's true. But then, if you're fixing them, then you're coming away from that, right?

Q Well, hopefully you're in the business of fixing that, right?

MS. BOYD: And that's what I'm saying. In the process that we've implemented for our environmental effects monitoring program, we started by identifying -- selecting effects parameters, measuring those, confirming if effects occur or not, and then we introduced investigating the cause of those effects and investigating solutions.

Q Right.

MS. BOYD: So we're moving in that direction such that -- that's why I was just debating "chronic" because we're moving towards a solution.

Q Yes, I understand.
MS. BOYD: I'm not trying to --
Q I take that point, Ms. Boyd, and I'm sorry, I didn't meant to cut you off, but I take that point --
MS. BOYD: No, it's okay.
Q -- that you're moving towards solutions and you're focusing primarily on the reproductive aspect of fish and trying to arrive at what's causing the diminution in gonad size in fish, which could potentially affect the fish's ability to reproduce; is that right?
MS. BOYD: That's correct.
Q Okay.
MS. BOYD: In that particular study.
Q And so what I'm doing, in effect, in going through this Canada document is to point out that it's not just a reproductive effect that can be characterized as a sublethal effect, but, for example, there's physiological -- if you continue on, there's morphology can also be symptomatic of some of the studies that -- and let's just continue on. Let's go to Morphology, which you will find at the top of page 23, and the authors here of this federal document say:

> Various degrees of skeletal deformities as well as fin and gill erosion have been reported in fish from areas near bleached pulp mill discharge.

And there's a number of references, I take it, to some reports that come after this. So morphological, it's not uncommon, then, that morphological changes have occurred to fish as a result of their exposure to pulp mill effluent; is that right?
MS. BOYD: I guess, I mean, I don't have the studies, and I'm reading this, and while that can be true, part of what we're missing here is kind of a better understanding of which papers these are and what effluent that they're measuring it in because, again, going back to the issue of improving the effluents --
Q Right. And I --
MS. BOYD: -- they may not all be the same. If we measured studies from the '70s, we'd be dealing

with a lot more toxic effluent. So it's hard sometimes to make a determination here without knowing more about those studies.

Q Yes, I can appreciate the fact that you're a scientist and you, as a scientist would want to research the journals and make sure that you would -- your opinion would conform to that. But I've taken you to a Canadian document, so I'm assuming that if Canada is putting this document forward that it's not going to be in the business of misleading the public, certainly, is it?

MS. BOYD: I just am not -- I just don't know all of the references it's referring to, so I'm just not sure what timing it is when those studies were done and what the effluent was like then. So I'm just saying that it could have been substantially improved and so it may not reflect current situations.

Q Okay. How about let's continue on. Page 23, there's a reference there to mutagenicity. And it says:

> Bleached pulp mill effluents have been found to be mutagenic using standard tests.

Now, I'm going to take you to a specific test, which is document 3 of the Conservation Coalition's documents. It's also document 28, I believe, of the Commission Counsel's documents. So this is a document entitled, Genetic Toxicity of Pulp Mill Effluent of Juvenile Chinook Salmon Using Flow Cytometry. Are any of you familiar with this report? Have you read it before you came to testify today?

MS. BOYD: Yes, I have.

Q So just looking at the abstract, I'm not going to take you through the report in any depth, but looking at the abstract, it looks as though there was a study done by Dr. Easton. Are you familiar with Dr. Easton, at all, and his work?

MS. BOYD: Yes, I am. And I did read it at the time that it came out.

Q Yes. And he's a scientist of some report and renowned, is he not?

MS. BOYD: Yes. and Dr. (indiscernible - overlapping speakers) --

Q And you're not going to quarrel -- you won't

quarrel with the findings in this report, will you?

MS. BOYD: I may have an opinion on it.

Q All right. And I'll get to your opinion on it in a moment. But in terms of Dr. Easton's reputation, I mean, he's not here to defend himself, but you're not going to --

MS. BOYD: Oh no.

Q -- take issue with it?

MS. BOYD: No, no, no, and I don't really have trouble with the paper, either, other than to put it in proper context.

MR. LEADEM: All right, and I'll allow you to do that as soon as I mark it as an exhibit. And now minded, Mr. Commissioner, that I forgot to mark the last one as well. So if we can mark my document number 1 as the first exhibit that needs marking, Mr. Registrar?

THE REGISTRAR: Yes, that will be marked as 1041.

EXHIBIT 1041: Health Canada, Environmental and Workplace Health, Effluents from Pulp Mills using Bleaching - PSL1

MR. LEADEM: And that was the Health Canada document, Mr. Commissioner. And this particular document, written by Mr. Easton, is the next exhibit after that one.

THE REGISTRAR: 1042.

EXHIBIT 1042: Genetic Toxicity of Pulp Mill Effluent of Juvenile Chinook Salmon (Oncorhynchus Tshawytscha) Using Flow Cytometry

MR. LEADEM: Thank you.

Q So Ms. Boyd, I'll now allow you to express your opinion, because I think I'm obliged to do that.

MS. BOYD: I guess my first - I was going to ask you a question back - but I guess all I just wanted to make sure that this was put in proper context. This paper is about a method more so than looking at, for example, the results of genetic toxicity in pulp mill effluents. It's trying to assess this method. This is the first time that they had actually used a method, the flow cytometry, on fish. It had previously been used on rats and

some other animals. So that's what I think, as the study is done and looking at it as a potential tool, it was done well in that regard.

There are some statements that I would, I guess, that aren't supported in there. For example, where it indicates in there that the effluents that they tested in this test are found in the river, and there was no evidence in the report, itself, that that occurs. And from the information I have on -- have seen on the river, I've not seen those concentrations, for example, eight and 16 percent. But the study did look like it had good potential for that to be a method. But then that was the first stage. It still has to go through further stages of research to get to a point where it could be used as a tool, because it was raised as a potential tool for environmental effects monitoring, but it wasn't ready to, for us, to be able to use in a way to be able to say, "Okay, well, what exactly does that mean?" When we have our parameters for measuring our fish in the standard fish survey, we measure age, growth or size at age, condition, liver, and gonad, and we have a way of looking at that pattern to determine, ultimately, what type of effect we have.

Whereas in this flow cytometry, in this method it was more about development and it doesn't tell us exactly how we would apply that to what that indicator means in the end. There's a lot of studies that come up with indicators because somebody's trying to find a good tool that you can use that you can measure on a frequent basis, and it's a great concept, but it just needed to go further.

So I guess what would be more interesting, it would be the papers that came after this that would have taken it to those steps, and I don't know if it's gone there.

Q Are you familiar with something that came after this?

MS. BOYD: No, I'm not. That's what I'm just saying.

Q Okay.

MS. BOYD: That was, like in my opinion, that's the first stage. And I know I even had conversations with Dr. Kruzynski, at the time.

Q Right. He's with DFO, is he not?

MS. BOYD: Well, he's retired. He's enjoying himself. Well, he was probably enjoying himself before, but I'm just saying that we did have a discussion about -- like it's you had to be -- like you have to be cautious of where you take the results there, because this was like the first stage.
Q Okay. I want to just get back to - and I have just a very brief amount of time remaining to me - I want to examine with you an expert's report, which has been marked as Exhibit 826 in these proceedings, and it's the report that Mr. Don MacDonald has done about contaminants in the Fraser. It was our expert's report number 2. and I'm going to take you to pages 140 and 141 of that report, and there's a number of --
MR. LUNN: Is that the paper page 140?
MR. LEADEM: 140 of the -- I'm looking for the conclusions. I think it was at the tail end of the paper.
MR. LUNN: Yes.
MR. LEADEM: There we go, "Recommendations". That's what I'm looking for.
Q So have any of you on the panel read this before coming in to testify here? That would make my job easier. It was on your list --
MR. GRACE: I read it last week.
Q That's good. Any of the federal representatives, have you people read it?
MS. BOYD: I've read parts of it.
Q Okay.
MS. BOYD: I confess, it wasn't easy to get through all of it.
Q I'm specifically going to take you to the recommendations. I don't expect you to read it all, because there's a lot of reading here, but it is on a topic that I would have thought most of you would have wanted to read about because it discusses contaminants, and your field is contaminants in the Fraser system, or contaminants generally in the province, is it not? I'm getting blank stares.
MS. BOYD: Go ahead.
MR. GRACE: I'm just agreeing with him.
Q Well, let's start with you, Mr. Grace. You seem to be -- contaminants in the Fraser is something that obviously concerns you, correct?
MR. GRACE: Sure.

Q All right.
MR. GRACE: Although I look more at the Thompson.
Q Yes, I understand.
MR. GRACE: Yes.
Q Let's look at some of the recommendations here, because Mr. MacDonald, after studying specifically the sockeye and the contaminants in the Fraser with regard to sockeye, has made some recommendations. And the first one he says is:

> Effluent monitoring programs for all industrial sectors should be reviewed and evaluated to determine if they provide the necessary and sufficient data to characterize effluents and evaluate effects on aquatic ecosystems. The results of such monitoring programs should be compiled in a single database that is publically accessible.

Do any of you on the panel have any reaction to that? Does that sound to you like something that's eminently sensible?
MR. HILL: Yeah, I think reviewing the monitoring reports, or the monitoring programs makes sense and it's something we do.
Q And having these readily accessible in a single database, is that also something that would be of similar use, Mr. Hill?
MR. HILL: I don't know. We make use of the data that's in the provincial BMS system, and I don't know how that might affect other people.
Q I get the sense that, Canada, you've got a database, and B.C. has a database, but somehow the databases aren't talking to one another; is that true?
MR. GRACE: The databases may not, but I know I have access to the Environment Canada database.
Q Right.
MR. GRACE: And download data on occasion.
Q Is there a lot of sharing amongst the -- of the databases between the two groups, between the Province and the Federal Government? Do you have free access to those databases?
MR. GRACE: I think part of the issue is none of us here are database experts. There's other people in our organization that look after those matters, so hence the blank stares.

Q Okay, you're like me; you trust somebody else to do the technology for you or the IT stuff, right? Okay.

MS. BOYD: I was going to say, it's certainly a good idea.

Q Okay.

MS. BOYD: It is a hurdle getting over -- getting to a database, and I would just kind of stress that if you can convince -- I mean, I've found over the years, that it is -- you can get a database developed, but it's sometimes difficult to get -- maintain that database and ensure that the resources are put to that. So I think it's a great idea to be able to put -- to have data publicly accessible, but it would be a definite challenge to try and put all of it together in one database.

MR. LEADEM: All right I think my time is up, so I'm going to cede the floor, but I thank you for your answers to my questions.

MS. BROWN: Thank you, Mr. Commissioner. My name is Anja Brown, and with me is Kennedy Bear-Robe, law student, and we're here, today, on behalf of the First Nations Coalition. The First Nations Coalition is made up of some of the tribes from the Fraser River, some Fraser River aboriginal fishing organizations, the Council of Haida Nation, and also some of the Douglas Treaty Nations.

CROSS-EXAMINATION BY MS. BROWN:

Q So in the remaining minutes I'll start out, Ms. Boyd, by taking you back to your evidence of this morning, and you spoke of a local monitoring committee and indicated that the people or the groups that sit on such committees depends on the particular mill at issue, but can include First Nations and non-governmental organizations. And my question is whether you're able to provide a specific example of such a committee on the Fraser River?

MS. BOYD: There isn't on the Fraser, we just have the Upper Fraser Mills, which work as one group, and then Domtar, which EEM is linked to it and we do have this Thompson River monitoring group. So there is, I guess, a link to the EEM program for a

mill on the Fraser with aboriginal --
Q Right. And Mr. Grace, you talked about the Thompson River group. So is that an example of a local monitoring committee?
MR. GRACE: It sort of incorporated the local monitoring committee, but it's above and beyond what typically goes for just the pulp mill. It includes representatives from -- well, because of the municipal sewage side of it and the rest.
Q So speaking, then, on the committee that you've been involved in, what sorts of input would you receive or would the committee receive by the various First Nations participants?
MR. GRACE: At this point, it's mostly access to their sites that we sample at. The main participant would be the Kamloops Indian Band, because of their proposal to put in a sewage treatment plant, but that hasn't gone ahead. But certainly when that does go ahead, then they would become an active partner as far as incorporating their -- voluntarily incorporating their monitoring program into the entire partnership program.
Q So does the Kamloops Indian Band have its own monitoring program in place that provides some contribution to the committee?
MR. GRACE: Not at present.
Q All right. And is that something that's being discussed?
MR. GRACE: Yes.
Q And does the Kamloops Indian Band or any of the other First Nations participants in that committee provide any feedback with respect to concerns that they have on the effect of pulp and paper mills on sockeye salmon?
MR. GRACE: Well, they can present any of their concerns. I don't know whether they have had any particularly with sockeye salmon, but at our annual meetings they are invited and they can have input at that point.
Q All right. And then what's the next level? The input that's provided to the committee, who does that go to for consideration?
MR. GRACE: From a legislative point of view, it would -- if it's impacting the provincial permit, then we would deal with it. If it was going to affect the federal EEM monitoring, then Janice would deal with it.

Q Ms. Boyd, this morning you talked about the Smart Regulation Initiative. Is that a national -- or was that a national initiative?

MS. BOYD: Yes, it was. I mean, that's -- the program was called Smart regs, I think it was. The point was anyone could put a reg forward to try and make it more effective, and so the EEM -- the EEM was put forward to do that, and previously there had been one for pulp and paper air emissions.

Q And do you know if there was any B.C. input to that initiative?

MS. BOYD: I don't believe so, other than like from the regions we got requests for providing some information. So that would be the B.C. input from B.C. But not provincially, that I know of. I'm just trying to remember from the list of people in the front, if there was any kind of provincial -- I don't think so, but I just have to look in that front cover of the Smart Regulation document.

Q All right. I'll just move on in the interests of time. Mr. Lunn, could you please turn up Exhibit 1033. And if we could go to vii, which is the list of recommendations. And Mr. Hagen, you'll recall that you were asked some questions this morning with respect to some of those recommendations. Any my question is on Recommendation 34, which is a recommendation that communications between all stakeholders involved in EEM should continue beyond the mandate of the Metal Mining EEM Team, that it should include annual stakeholder meetings or workshops to get an update to discuss new science and other issues as they arise. And my question to Mr. Hagen, or to anyone on the panel that might be able to answer this, is whether Recommendation 34 has been implemented?

MR. HAGEN: Yes, I can answer that. Our Recommendation 34 is one of those recommendations which we see as one that we can be implementing as we go along by making changes to our practices and ensuring that the spirit of the recommendation is followed. So perhaps I can illustrate that with a couple of examples, and one of them would be metal mining. The EEM program had an Investigation of Cause Workshop about a year ago, and First Nations were a part of that. Other stakeholders were invited to be a part of that workshop. So environmental

groups were there, First Nations were invited. So that would be one example where they have an opportunity to -- for specific feedback into a particular aspect of the program.

And another example would be, getting back to your previous question about First Nations' representation on a local monitoring committee. If we look at Gibraltar, for example, they have a technical advisory committee which has First Nations representation, I believe. And we've informed that committee about the requirements for EEM and the monitoring that is required and invited other stakeholders, via that committee, to provide feedback about monitoring they might like to see incorporated. So that's one aspect of it.

And also, via that panel, or separate to that, the First Nations have had an opportunity to comment on the permit and perhaps have -- bring their concerns forward so that can be incorporated into the provincial permit and also into the monitoring programs that are being done. And the idea here is that we would try to do the best of our ability to harmonize so that all stakeholders who have concerns that require environmental monitoring, the federal requirement, they're met, the provincial requirement, they're met, and any other significant concerns that other stakeholders may have can also be addressed in that program. So that would be a good example of that.

Q Right. And would you agree that such collaboration between various stakeholders and also First Nations is not only an opportunity to provide input, but also an opportunity to share different sorts of expertise?

MR. HAGEN: Yes. And the qualifier there is when we do invite other representatives to the table for a local monitoring committee whether it be an environmental group or First Nations, we do ask that there's technical input. So there is that aspect of it.

Q This morning, in response to some questions that Ms. Baker had with respect to compliance, Mr. Hagen, you indicated that compliance isn't something that you follow closely, but your sense of it was that there's generally good compliance. And what I'm trying to understand is, is compliance part of a different department from

monitoring?
MR. HAGEN: Yes, it is. Janice and I are involved with compliance promotion, so we work as advisors primarily to our management and to other stakeholders, other groups, informing them what they need to do to be in compliance. But we do have an enforcement branch which will actually do inspections and check whether compliance requirements are complied with. So if there are any out of compliance incidents, we should inform our enforcement people.
Q Right. And does enforcement, in turn, communicate back to you on what the outcome of their investigations are?
MR. HAGEN: They do, yes. We have a good working relationship with enforcement and ourselves and we talk about the various cases and, well, the sites. We share information, basically, to keep each other informed.
Q So an important element of understanding observed effects and developing solutions is the level of compliance and what the outcome of enforcement action is; is that correct?
MR. HAGEN: Well, perhaps it would be useful if I clarify. We're talking about environmental effects monitoring, specifically. Recall that the objective of EEM is to assess the adequacy of the regulations. So a lot of the information we're collecting goes towards generating that information that we need to assess whether the regulations are adequate. So the compliance issues in that instance with EEM are basically conducting an appropriate program on specific timelines and ensuring that those reports come in on time and that the data is generated.
Q Mr. Lunn, could you please turn up paragraph 214 of the PPR. This paragraph refers to a train derailment that took place in 2006 near Lytton, where there was a spill of 800 tons of metallurgical coal into the Thompson River. And if we can -- we can see there, in the second part -- or the second sentence of that paragraph that the spill occurred during the late summer Fraser River sockeye run. Is anyone on the panel aware of this incident?
MR. GRACE: I was involved in that.
Q All right. Mr. Grace, are you able to advise what

type of remediation occurred as a result of that incident?

MR. GRACE: I wasn't sort of the on-ground person, so I couldn't say for sure what all happened, but the coal that was along the banks was removed, the cars that were still on the bridge were removed, and then at some point I know there was a lot of discussion about when to remove the cars that were actually in the river, but I don't know exactly when they were removed. They didn't want to remove them right then, because of the sockeye and other salmon running through. I think they waited until much later into the winter, when there were no migrating salmonids going past the site.

Q And whose responsibility was it to attend to those various remediation steps?

MR. GRACE: In this case, it would have been the railway companies and their consultants that did the actual hands-on remediation.

Q And do you know if there was any documented detrimental effect to the salmon run as a result of that accident?

MR. GRACE: I'm not aware of any documented impacts. I know there was a fair amount of monitoring done to try and confirm or disprove, whichever, whether or not there was an impact, but I don't think any of the monitoring showed anything too much, other than they did find a bit of coal deposits in some of the depositional areas, very thin layers of coal.

But it turns out the coal wasn't as bad as it could have been because the coal, when it's processed, is heated up to a very high temperature to -- it's washed and dried and dried at a very high temperature which actually dries off the volatiles, which tend to be the more toxic fraction of the coal. So if it had been raw coal, there would have been much more problems with things like PAHs, which were not present in this coal because of the high temperature drying.

Q Okay, my final question is with respect to mines that have been closed. What is the duty on a previous owner to remediate ongoing -- the discharge of ongoing deleterious substances into waterways?

MR. HAGEN: Well, just generally speaking here, a mine owner has an obligation to address a s. 36(3)

issue. So we have our inspectors identify that there is a discharge that is deleterious to fish and is emanating from a mine at it, and if we can identify an owner, then our enforcement staff will be directing the owner to do something about the problem.

Q And what are the legal consequences if an owner fails to do that? And by "legal" I simply mean pursuant to the regulations.

MR. HAGEN: Well, I'm not really the proper person to answer that, I'm not an enforcement officer, I don't have the training, but I do know that they have a number of options, inspector directions, all the way up to court prosecution.

Q And are you aware of that happening in any case in B.C.?

MR. HAGEN: Currently, we have an inspector direction regarding the Tulsequah Mine, the Tulsequah, Chief, which is not in the Fraser Basin, and that is probably the highest profile ongoing inspector direction that I'm aware of. I do know that there are other inspections going on, but I'm not familiar with the cases.

MS. BROWN: Thank you. Those are my questions.

THE COMMISSIONER: Thank you, Ms. Brown.

MS. BAKER: I just have one question of re-exam. I don't know if Canada has any as well.

MR. TIMBERG: One short question. Mr. Lunn, if we could go to Exhibit 1027.

CROSS-EXAMINATION BY MR. TIMBERG, continuing:

Q Ms. Boyd, you've been asked about the Smart Regulation and whether there had there been any input from other stakeholders in it and you asked to see this document. And I think if we could look at page 2, if you could summarize the input?

MS. BOYD: Yeah, I did take a quick look, thank you.

Q I think page 2 and then 2 and 3 talks about -- is that what you needed to see?

MS. BOYD: Yeah, what I was looking for was the list of participants that are listed there. The Privy Council. So there's industry. The Privy Council, I think, was driving this initiative, and that's their presence, environmental group Pictou Harbour, and DFO. The aboriginal representation was Chiefs of Ontario. So I guess the answer was,

no, there wasn't provincial representation on this at all.

Q And if we could just turn to page 3, at the top, and it looks like Saskatchewan and Alberta were consulted?

MS. BOYD: Yes, and they are, under the regulation, they are the regional authorization officer under the pulp and paper regulations is Saskatchewan and Alberta, as opposed to our regional director of environmental protection operations, which is the authorization officer for the rest of the provinces.

MR. TIMBERG: Thank you. Those are all my questions.

MS. BAKER: I have no re-examination, actually. So we're finished for the day. It sounds like the city's on a boil out there, so we --

THE COMMISSIONER: Ms. Baker, I wonder if I could just ask this. Mr. Leadem, at the end of his cross-examination -- if Mr. Lunn could bring up Exhibit 826.

MR. LUNN: Certainly.

THE COMMISSIONER: And Mr. Leadem had turned up the recommendations that exist within that lengthy report, and obviously these witnesses may have had access to this report prior to today, but it is a lengthy report and they may not have had a reasonable opportunity to really have a close look at it.

Mr. Leadem was interested in their response to some -- at least Recommendation 1, but perhaps he was going to go on, had he had time, to the other recommendations. And I would like to invite Commission Counsel to talk to Mr. Leadem and counsel for the Federal Government and the Provincial Government to see if this is an appropriate and unique situation where the Commissioner could have the opportunity to hear any views that these four representatives have with the Province and the Federal Government with regard to these recommendations because, as I say, time is short today and they probably haven't had a sufficient time to -- now, they may not be, at the end of the day, the persons who could respond to all of these recommendations, but I simply invite the four of you to have a word to see if we could not elicit that information from them, to the extent that they can do it, and then put that

on the record so that we have their response to these recommendations, and I say to the extent that they are able to provide that response.

MS. BAKER: Thank you. I'll talk to my friends after the break.

THE COMMISSIONER: I would be grateful for that. Thank you very much, and thank you, Mr. Leadem.

MS. BAKER: Thank you to the witnesses for showing up today and giving their --

THE COMMISSIONER: Yes, I wanted to thank you, Ms. Baker, to you, and I want to express appreciation to the four of you for coming here, today, and answering questions and making us aware of your knowledge about these matters. Thank you all very much.

We're adjourned, then, until ten o'clock tomorrow morning, is that correct? Yes.

MS. BAKER: Yes, that's correct.

THE COMMISSIONER: Thank you.

THE REGISTRAR: The hearing is now adjourned until ten o'clock tomorrow morning.

(PROCEEDINGS ADJOURNED TO TUESDAY, JUNE 14, 2011, AT 10:00 A.M.)

I HEREBY CERTIFY the foregoing to be a true and accurate transcript of the evidence recorded on a sound recording apparatus, transcribed to the best of my skill and ability, and in accordance with applicable standards.

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Pat Neumann

I HEREBY CERTIFY the foregoing to be a true and accurate transcript of the evidence recorded on a sound recording apparatus, transcribed to the best of my skill and ability, and in accordance with applicable standards.

_____

Diane Rochfort

I HEREBY CERTIFY the foregoing to be a true and accurate transcript of the evidence recorded on a sound recording apparatus, transcribed to the best of my skill and ability, and in accordance with applicable standards.

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Karen Hefferland