House of Commons
CANADA

Standing Committee on Environment and Sustainable Development

ENVI • NUMBER 028 • 2nd SESSION • 40th PARLIAMENT

EVIDENCE

Tuesday, June 16, 2009

Chair

Mr. James Bezan

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● (0900)

[*English*]

The Chair (Mr. James Bezan (Selkirk—Interlake, CPC)): Order, please.

I want to change the agenda a little bit. We have a notice of motion from Mr. Warawa.

Mr. Warawa, perhaps you will read it into the record.

Mr. Mark Warawa (Langley, CPC): Thank you, Chair.

I'm moving that the committee on environment and sustainable development call Mr. Bruce Hyer, MP, who introduced Bill C-311, An Act to ensure Canada assumes its responsibilities on preventing dangerous climate change, into the House, to appear as a witness to speak to the bill.

It's to provide direction to the committee. The clerk would then be able to invite Mr. Hyer. We start in two days, so we need to find out who our first witness is. We haven't agreed on a group of witnesses, which we need to do, and maybe follow up at the beginning of the fall, when we come back. Anyway, to get us started, I'd like to see Bruce invited.

That's the motion.

The Chair: Mr. Scarpaleggia.

Mr. Francis Scarpaleggia (Lac-Saint-Louis, Lib.): Yes, of course, we agree with this motion. My only concern is that we're devoting two hours to one witness.

Is it possible to have Mr. Hyer appear for one hour? We can then use the second hour to discuss some future business items, including potential witnesses for Bill C-311, but also to maybe give some very broad drafting instructions to our researchers for the summer, for the water and oil sands report, and also to discuss, perhaps, witnesses for SARA when we get back in the fall.

The Chair: Mr. Warawa.

Mr. Mark Warawa: Thank you.

I think that's a good suggestion, for us to have a first, second, and possibly a third round, so that Ms. Duncan would have a second chance to question Mr. Hyer.

I'd suggest, then, we hear from him, have our three rounds, and then break into a meeting for future business. I'm foreseeing that as maybe an hour and a half with Bruce and then a half hour with your suggestion.

The Chair: Ms. Duncan.

Ms. Linda Duncan (Edmonton—Strathcona, NDP): I agree with Mr. Scarpaleggia. I think an hour is sufficient, simply to introduce the bill. This is the second round, same bill, and we've already debated it, so I think Mr. Hyer is looking forward to coming in and presenting.

I concur that it's useful to spend some time talking about what we're going to do with the two reviews that we've done. I understand we're going to be having further witnesses on SARA, but my understanding is that on oil sands and water, after today, it's over. But I would hope we're going to have a little more discussion than 20 minutes on providing direction or advice on where we want to go on the report. I hope we would have an hour simply dedicated to that.

I would also encourage the members to come forward with the beginning of a suggested list for Bill C-311 and any ideas on amendments, so we can expedite that process. We could then proceed immediately into completing Bill C-311, which would be appropriate because we will be starting that on Thursday and it should be the first order when we come back in September.

● (0905)

The Chair: Okay. So I think we have—

Ms. Linda Duncan: Presuming we don't meet next Tuesday.

The Chair: Yes, we're making the assumption that we're not meeting next Tuesday.

I think there's understanding that we'll have Mr. Hyer here, we'll go through at least two rounds with him, and then we'll move into future business, if that's okay with you, Mr. Warawa. That should give us an hour and an hour.

Is there any other discussion?

Seeing none, I'll call the question.

(Motion agreed to)

The Chair: We'll move on to the rest of our meeting.

Joining us at the table is Dr. George Dixon, vice-president, university research, and professor of biology, University of Waterloo, and Dr. James Barker, professor of the Department of Earth and Environmental Sciences, also at the University of Waterloo.

I welcome both of you and look forward to your presentation as we conclude our discussion on Canada's oil sands and the water resources surrounding them.

I'd ask that you make opening comments. If you can keep them under 10 minutes each, I'd appreciate that very much.

Dr. D. George Dixon (Vice-President, University Research and Professor of Biology, University of Waterloo, As an Individual): Good morning, and thank you very kindly.

It's a great pleasure to have the opportunity to meet with the committee this morning. I'm going to give you just a very brief background, and then I have made four recommendations in here based on my work in the oil sands for about 15 years, where I saw issues that needed to be addressed going forward.

My understanding is that I have something in the order of eight minutes, and I hope I won't take anywhere near that time to address some of these issues. Jim Barker and I are actually going to give a brief summary and then present ourselves for questioning. We have seen that you have been through a lot of testimony, and we expect you might have some points of clarification you feel we could assist you with.

I and a number of my colleagues have been working on the oil sands since about 1983. We have effectively worked in two areas of research, one that I'll call on-lease activity, that is, research done on the leases of the oil sands companies—predominantly Syncrude and Suncor, because those were the only two active companies out there when I started doing this type of work—and the other area of activity that we've undertaken is what I'll call off-lease activity, the activity of trying to look for effects in the environment in the Athabasca River.

The work we've been doing on the leases has really been directed toward two end-points. One of them is the environmental toxicology of the chemicals that are associated with the water used to extract bitumen from the oil sands. These are principally naphthenic acids, which I suspect you've heard about before, and alkylated polycyclic aromatic hydrocarbons, a class of compounds associated with all oils. We have also looked at issues around salinity, both sodium salinity and sulphate salinity, that occur when you effectively expose the oil sands to water and the salts leach out and end up in the processed water that's associated with extraction.

We've been doing this work on the leases for two reasons. One of them is basic toxicology, to try to determine the threshold concentrations of these chemicals that would be expected to cause an effect in aquatic organisms. Once you have that body of toxicology information, you can effectively start to set water quality standards, or PWQOs, provincial water quality standards in Alberta; or federal water quality guidelines, through CCME, the Canadian Council of Ministers of the Environment. For naphthenates, there are no standards of that nature because the basic toxicology was never done.

So we're looking at understanding the toxicology of those compounds, should there ever be a requirement to effectively set standards for the release of waters into the Athabasca drainage.

The other reason we're trying to understand these compounds' toxicity has to do with the so-called end-pit lake strategy, where you effectively put tailings of some form into a mined out area, cap them with water, and hope that through time this will develop into a natural lake system. When I say “hope”, I mean there have been a number of scale-up demonstrations associated with this, but the only full-scale first attempt at an end-pit lake has yet to be initiated. It is going to be done by Syncrude Canada with their Base Mine Lake tailings pond. My understanding is that Suncor is in the planning stages to initiate their first end-pit lake within the next, I think, probably two to three years. Those are, technically speaking, demonstration activities.

The other area we have been looking at has to do with off-lease activity. We have been looking for impacts associated with oil sands-type materials in the Athabasca watershed. I had some references included in the work we've done looking at impacts on larval fish and impacts on reproductive activity in free-living fish in the Athabasca drainage area. We did most of that work prior to 2003. Really, what we're looking at there is whether we can demonstrate effects in the Athabasca watershed of oil sands-like materials. They may come from natural erosion of oil sands deposits in the area, or they may come from activity—although at the present time, I expect the majority of the effects we're seeing in the receiving environment may in fact be the result of naturally occurring oil sands. But no one has really looked at that to any great extent.

So those are the two areas of activity.

● (0910)

There are key concerns to be addressed. I had four issues that I think we need to be conscious of as a society as we move forward in looking at exploitation of these oil sands resources. As I stated above in my brief, there are chemical inputs into the river that occur naturally and there are inputs that can occur from industrial activity. We don't know what the relative contributions from each are. We don't know whether or not the system can accept any further loading of oil sands-type materials beyond what is naturally occurring. We really have no standards of how we would effectively allow any kind of a release from the system, should it occur. In some ways we really are not fully cognizant of what the potential cumulative impacts are of the various oil sands industries or the other municipal and industrial and agricultural uses of water in that watershed.

By the way, when I'm talking about impact in the system, I'm really talking at the present time about defining whether there are effects we can observe in the system now. That's one question. The second one, after you've established whether or not there are effects, is what's causing those effects. They may be naturally occurring. They may be as a result of anthropogenic activity. The first step is to take a look in the environment to a greater extent than we have done now.

The other area that I don't really think we have a fully integrated, sustainable management strategy for is water in the Athabasca drainage, in terms of surface water and groundwater and interaction. I'm going to let Jim speak to that to a greater extent.

At the present time we have not spent a lot of effort as a society looking at what I would call ecosystem and human health impacts of potential contaminants that are transported off the oil sands leases into the Athabasca drainage. There is no permitted surface water, effectively emissions, into that system at the present time. There are very likely a couple of groundwater inputs to the Athabasca River. We know very little about what I would call atmospheric transport and deposition associated with the potential contaminants. What we really need to be looking at are the potential impacts of that. Can we quantify them? Can ecosystem benchmarks and standards be developed that would allow us to look at the potential impacts that are there at the present time?

Remember, I want to get back to this first question. I'm not particularly worried at the present time about attributing blame in terms of who is responsible for what in terms of the impacts. Let's find out if there are effects first and then worry later about where they're coming from in terms of a risk analysis and division mechanism that would allow us to identify where they are coming from.

The last comment I will make has to do more with information availability and assimilation activity around all the data that's available in the oil sands. Integration of activity is a very large issue. Up until about five or six years ago, a relatively limited number of players were doing research in this arena. As the number of oil sands companies has increased, as the number of different monitoring programs has increased, at the present time the total impact of the work fails from an inability to integrate all that information and pull it together to be able to make a decision framework type of exercise. You have the northern river basins study that provided data. The Panel on Energy Research and Development, PERD, produces this information and funds research. CEMA produces research. RAMP produces research. CONRAD produces research. There is a certain degree of overlap among the activities they undertake, but often information is available to one group that would be of very great use to the others. But the mechanisms for moving that forward and trying to integrate that are at the present time relatively difficult.

I've been working there for 15 years with a number of different partners and I have difficulty pulling data together from some of these different areas when I actually know what data I'm looking for. If you're in a situation where you don't have that body of experience and you literally don't know the one person to call who has that information, it becomes a much more difficult exercise.

I'm going to stop at this point and then pass it on to Jim Barker, who will talk a bit about oil sands and then some further issues around disintegration. I don't know whether you'd like both of us to speak and then go to questions or....

● (0915)

The Chair: We'll hear your comments first.

Dr. D. George Dixon: I certainly don't mean to intervene on your territory, Mr. Chair.

The Chair: No, no. I'll run the show.

Dr. Barker, if you'd please bring us your opening comments....

Dr. James Barker (Professor, Department of Earth and Environmental Sciences, University of Waterloo, As an Individual): Thank you very much. It's a pleasure to be able to address you.

As Dr. Dixon said, I'm a professor in earth and environmental sciences at Waterloo. My research has really been focused on groundwater issues in the oil sands and in the mining area of the oil sands. I have a number of collaborations at Waterloo, the University of Alberta, and the University of British Columbia. I'm also a member of Suncor's oil sands mine development and reclamation review board; however, I don't represent Suncor or that review board in this presentation. It does give me some additional exposure to the problems that Suncor faces with water, however.

I'm really focusing on the groundwater issues in the oil sands mining area. I recognize that groundwater is perhaps even a more important aspect of the in situ operations, but I don't have any personal research experience in that area.

The major concern in the oil sands mining areas, as Dr. Dixon said, is seepage of process-affected water into aquatic and terrestrial ecosystems. My research is really focused on those issues, looking at groundwater as a potential pathway to these receptors. My research has been within the operational phases of the oil sands facilities and really is not being done in the context of the ultimate reclamation. However, the research that we provide I think gives us insight that we can see starting to be incorporated into planning and reclamation.

So in terms of seepage from tailings structures, you've heard testimony about it. My research has examined the migration and fate of contaminants in process-affected water as it moves in the subsurface. The source of this water has been the tailings facilities. Our research, for example, demonstrates that a small fraction of the seepage can escape the current collection systems we have. That information is relayed back to the operators, and it should lead to improved dike seepage collection and maintenance, which seem to be the main issues in allowing some uncontrolled seepage.

You have seen Suncor's Tar Island dike and Pond 1. It's always nice to get a tour of that area. It's a large area. Suncor's Tar Island dike contains Pond 1, the oldest pond in the industry. We've just had accepted a research paper that provides a hydro-geological analysis of the seepage from this pond and dike system, and our findings are consistent with findings of Suncor's consultants over the years. So I don't think we provided much new information to the company. Seepage of process-affected water is occurring from Tar Island dike into the sediments of the Athabasca River, so in a sense I'm delivering a problem to Dr. Dixon now.

The interesting part for us is that the numerical modelling that tries to tie together all the available data suggests the bulk of the seepage water is from the dike, not from the pond. It's a bit of a moot point because the dike in fact was constructed with process-affected water, so the leakage from the dike is chemically very similar to the leakage from ponds. However, since the dikes are dewatering naturally, the impact will be less over time. If it were leaking just from the pond, and if the pond were never reclaimed, you could imagine the leakage continuing over time.

Many of you have seen, I think, Suncor's initial efforts to reclaim Pond 1. I was up there last week, and I think they're on schedule for completion of the removal of the fine tailings this year, and they've actually started placing reclamation material on that pond. So that's some very timely progress.

Waterloo graduate students, technicians, and faculty have also investigated other areas where process-affected water is seeping into groundwater. Again, our research is trying to assess the fate of these chemicals as they move through groundwater. Naphthenic acids have been our focus. We build upon laboratory research at Alberta and Waterloo and in the National Water Research Institute in Saskatoon.

The bottom line so far is that the major toxicants in naphthenic acids don't undergo any significant attenuation in the groundwater system. They're just diluted by the normal weak dispersive processes that occur there.

● (0920)

An interesting aspect of that research has been an attempt to identify whether or not these plumes of process-affected water are leaching toxic metals from the aquifer. The view would be that if the plume was causing the leaching of natural metals, the owner of the plume would be the owner of the metals issue. To date, while iron and manganese have been mobilized, the toxic trace metals, including things like arsenic, show no indication of being mobilized. That research continues, but so far we haven't seen a significant problem in that context.

Seepage, I think, is certainly going to be a continuing problem in the operational phases of these plants. Newer oil sands tailings operations are forced, really by geography, to be located closer to or on top of sandy aquifers, so the potential for water to move into those aquifers and to move away is enhanced. Understanding the hydrogeology relationship between the pond, the dike, the groundwater, and the surface waters nearby will be critical to managing those seepages and minimizing them.

We now recognize that the risk of at least local groundwater contamination is fairly high, so in response researchers are also looking at evaluating potential ways to remediate those situations. One approach is to pump the water out of the ground and treat it on surface. That is consistent with what the oil companies are doing in terms of research to potentially treat their process-affected water in ponds.

Being hydrogeologists, we like to keep our heads in the sand as much as possible, so we're looking at in situ remediation methods. The research is at a very early stage, but what we're looking to do is see if there are any beneficial aspects of adding nutrients or other chemicals to the subsurface to enhance the natural rate of degradation.

What you really want to do is present the companies, the operators, with a number of options for remediating these situations should they occur. We'd rather have those options ready beforehand as opposed to too late.

I think Dr. Dixon has captured our concerns from a research perspective, and I'd like to really just focus on the last issue he brought up, which is this idea of what I would call a catalogue of what's gone on and who's done it. From my perspective as a member of the Canadian Water Network, which project Dr. Dixon leads, and through CONRAD and other venues in talking to colleagues, I'm continually amazed at how much research is actually going on related to water and the oil sands.

Like Dr. Dixon, I have a problem remembering who's doing what or even finding out who's doing what. For instance, we had a presentation a couple of weeks ago. The person from the Alberta Research Council was telling us about three projects that they've been undertaking in the last year, only one of which I was aware of, and those are our colleagues within the Canadian Water Network. Finding out what's going on is difficult for us.

As a researcher, I actually value different approaches. I don't think we want an organization telling us what to do and who's supposed to do what. For example, the different stakeholders have different needs that won't be served by all for one. What I'm really calling for is a way to try to pull the information together to get communication going among the researchers. That will make our work more efficient.

I guess my second concern stems from that. Is there a forum, then, for the research to be discussed? There are numbers of forums. Dr. Dixon often organizes a session within a larger meeting on toxicology. CONRAD organizes a meeting. Special sessions are often organized by various agencies and organizations, but these almost always tend to be well focused and with limited attendance.

What we think would be interesting, but almost impossible to do, is to offer some sort of venue where the research can be discussed and stakeholders can participate. As a member of the Canadian Water Network, I would put it forward as one of the vehicles that could help organize that sort of approach.

So my concerns really are cataloguing what's going on and finding a forum in which to have that discussed openly and freely.

Thank you very much for your time. I'll turn it back to you.

● (0925)

The Chair: Thank you, Dr. Barker.

Mr. Scarpaleggia, could you kick us off with a seven-minute round, please?

Mr. Francis Scarpaleggia: Thank you.

Thank you to the witnesses for being here this morning.

Dr. Dixon, the impression I got at the very beginning of your presentation was that there's still a lot of research to do surrounding water and the oil sands before we can really put our finger on what's going on there. Yet I get another message—and I don't know if it's from Dr. Barker or from you—that the research has been done; it's just that we haven't been able to pull it together or integrate it. There's that contradiction in my mind. How would you address that? How would you clarify that for me?

Dr. D. George Dixon: I think both perceptions are correct. We have come quite a way in enlarging the body of information on the toxicity of the individual compounds. I'm going to talk about "on the lease". The major issue that seems to be in everyone's mind is the viability of what is called the "end-pit lakes strategy". We now have an understanding of this through a number of test ponds that were constructed on Syncrude's lease. They moved to a demonstration pond, and they're now moving to the first full-scale demonstration of the approach. We've undertaken a lot of research in the toxicity of the individual chemicals. We know what the effects are at different levels of biota. We know what percentage of a lake should be relatively shallow water that will support vegetation around the edges. We know how much should be deep. We know something about the viability of the breakdown of the naphthenates and materials that will be in the system.

The next step, as you move that up operationally, is to build a 50-hectare lake in which you have tailings material in the bottom. You look over a ten-year period to see how this develops, and you determine, based on the modelling that you've done, whether it actually will work. Have we done the preliminary stuff so that we can move to the demonstration stage? Yes. Have we done the demonstration stage? No.

In the wider environment, people have done a lot of monitoring of the potential impacts on the Athabasca watershed. This is what RAMP has been doing for fifteen years. This is baseline-level monitoring. It is not research activity. It doesn't consider the aerial transport of contaminants from leases and the potential deposition in the environment. We've never actually looked at an integrated survey of the sediments in the Athabasca River to see if there is transportive material, how much of it is natural, and how long it's been occurring according to core drilling. There's lots of information, questions that still need to be answered.

Mr. Francis Scarpaleggia: Don't you think it's odd that most of the research seems to have been done with the interests of the oil sands producers in mind? They study the issue of end-pit lakes. Yet the broader, more important question is to find out what's happening in the Athabasca River, to find out if the heavy metals in the sediments are coming from the tailings ponds or if they're naturally occurring. Dr. Bruce said there were heavy metals in the sediments around Fort McMurray.

It seems to me that those are the big questions, and I'm wondering what RAMP has been doing all this time if it hasn't even come close to answering these questions. How do we make RAMP more effective? It's been heavily criticized for its methodology. How do we make it more effective and integrate the information that we have at the moment? You said there was a great inability to integrate information. Perhaps you could give us one concrete example of a difficulty in integrating information, so that those of us who are not scientists can grasp it a bit better.

● (0930)

Dr. D. George Dixon: I want to make one comment on the integration of data. We need more information, but we have difficulty in getting all the available information that would allow us to make decisions on what further research needs to be undertaken.

Mr. Francis Scarpaleggia: Is that because companies won't release it?

Dr. D. George Dixon: No, I've never had difficulty getting hold of companies. It's a relatively complex issue. Take the RAMP data. It is available to Environment Canada, DFO, and the companies. They'll provide you with a summary of the data. But if you want to get the raw data and look at it, a lot of it isn't in electronic format. This means you have to spend six months putting it into an electronic format before you can look at it. A lot has to do with getting the data in a timely fashion in a form you can use. That's part of it.

Mr. Francis Scarpaleggia: Is there a solution to that problem, or is it just an annoyance?

Dr. D. George Dixon: There have been two or three attempts to set up what I'd call larger data clearing-house activities, but most of them have failed as a result of a lack of human resources and financial resources.

I want to make a comment about RAMP. RAMP has been a program that has gone on for, I don't know, at least 15 to 20 years. It started out, I think, as a federal government monitoring program. It then was undertaken by the province. The province, I think, still manages it, but it's effectively supported largely by financial resources from the industry, and it's done by consultants. I don't take that as a problem. It's just a matter of being a statement of fact.

They respond to a need for information on sites where there could potentially be an impact. So they will go out and look at that. They might look at it for two or three years, and then they'll move to another site. They keep changing the actual sites they're looking at. They also change the parameters they're looking at based on individual demand. They change the reference sites they look at through time. So if you're trying to make some kind of decision on a 10-year basis of what's really going on, you'll have a three-year data set here and then switch to a four-year data set on another site. They keep changing the methods of chemical analysis, too. So it becomes a difficult entity to pull together.

You have to remember that when they started, there were two companies and a relatively small number of areas where you might expect an impact. Now we have six or seven leases that are active. They've broadened it, and they've kept moving stuff around because of resource issues. It's just poorly designed, I would suggest. That's the main problem. It's being done in good faith, but it's like trying to hit a moving target.

The Chair: Your time has expired.

We're going to move right along to Monsieur Bigras, *s'il vous plaît*.

[*Translation*]

Mr. Bernard Bigras (Rosemont—La Petite-Patrie, BQ): Thank you, Mr. Chair.

Thank you for coming and taking part in our study.

If I retain one thing from the statements, reports and briefs read or heard over the course of the past few days and weeks, it is that in order to clearly understand the state of the aquifer and groundwater contamination—

[*English*]

Dr. D. George Dixon: Hold on, please. I'm having a little difficulty with translation.

[*Translation*]

Mr. Bernard Bigras: In order to properly understand the state of the aquifer and groundwater contamination, two things must be understood. First, we need to know the source of the water and then the condition of the geological layers involved.

Do you have a good relationship with the Geological Survey of Canada, which provides financial contributions for some works? Is information being easily passed back and forth between you and the survey? Is it moving well? Is this allowing you to get your work done properly?

● (0935)

[*English*]

Dr. D. George Dixon: I think that's yours, Jim.

Dr. James Barker: It's a good question. I know that you've had presentations from and discussions with the federal and provincial people. The geology is a critical part of the hydrogeology, and the Geological Survey and the Alberta Geological Survey and Alberta Environment do all those things together. You're quite right that they have to be combined in a useful manner.

Most of my work is on lease, and the companies then have a large amount of information on lease. The geology and the hydrogeology is reasonably well understood on lease. The broader picture, which I think you were addressing, is clearly less understood. The mapping in the area, as I'm sure you've heard, is really just ramping up geologically and hydrogeologically. I believe that Alberta Environment has commissioned a study of the groundwater resources as they sit now. And the Alberta Geological Survey, I presume with the aid of the federal Geological Survey, is working on mapping these areas. Where they have mapped south of Fort McMurray, the maps are very useful, and it's a job well done. I'm not sure what percentage of the critical area is mapped, but it's certainly not 25%. So that's an ongoing activity.

The information on lease is quite good. Off lease is far less good and is very localized.

[*Translation*]

Mr. Bernard Bigras: Good.

Mr. Dixon, how about in your case?

[*English*]

Dr. D. George Dixon: Yes, I actually don't have a lot of activity associated with the geological services, because I don't tend to do much work in terms of groundwater activity. On surface water activity, the available information on flows in the different areas of the watershed and that type of thing is more readily available.

[*Translation*]

Mr. Bernard Bigras: Mr. Barker, you say—and others have told us the same thing—that the mapping is really just starting up and that an increase from three to five barrels of oil from the oil sands is expected over the next few years. Since mapping is just ramping up and there is some uncertainty about the additional pressure that will be put on the resource as a result of production, how can we be forward-looking and ensure that quality, the environment and health will be protected?

Since things are just ramping up and we know that there will be significant pressure, how can we guarantee the public that we will be able to ensure a healthy environment and water quality that respects various standards over the next 15 to 20 years? Is there not some danger here? Should the precautionary principle not, at the very least, push us into action at some point?

I think that scientists need to maintain a certain level of independence. In my opinion, one of the elements of governance for scientists has to be independence. Scientists need to be as independent as possible. I'm convinced that you are independent, you probably work with companies in the oil sector, and I don't doubt your independence.

As a scientist, should you not be taking into consideration the precautionary principle in making your recommendations?

[*English*]

Dr. James Barker: I think that's a good point philosophically. Oil sands mining is a human operation. Humans always undertake operations without knowing the full consequences of them. That's simply a fact of human nature. What we've relied on so far, I would say, is the operations aspects. Presumably Alberta Environment and the Alberta Energy Resources Conservation Board can tell you if the current operations are causing or not causing an unacceptable environmental impact. I think when you move into reclamation, because there's been little actual reclamation—the end-pit lake concept is not yet proven—there are large uncertainties going forward.

● (0940)

[*Translation*]

Mr. Bernard Bigras: Who is funding your research?

[*English*]

Dr. James Barker: It's financed by a number of sources. For instance, most of our projects at the moment are financed by the Canadian Water Network—which is a federal centre of excellence—and by oil sands companies. In my case it's also financed by the Canadian Foundation for Innovation and the Ontario Innovation Trust, and by NSERC, the Natural Sciences and Engineering Research Council of Canada.

Since I operate mainly on lease, my concern is with process-affected water. It's on lease. You can't undertake that research without the participation of the companies.

[*Translation*]

Mr. Bernard Bigras: To what extent does the company fund your research? Is 50 per cent, 40 per cent or 30 per cent of your funding from the private sector? I would like to have some idea.

[*English*]

Dr. James Barker: I would say it approaches 50%.

Dr. D. George Dixon: Perhaps I can make a comment with respect to that as well.

One of the issues associated with the financing of anything you do in the oil sands, or anywhere else, is that the groups that have the resources are in the industry. But in order to maintain one's independence from the industry, the strategy that I've always taken is to take a certain amount of money from industry and then match that with money through the Natural Sciences and Engineering Research Council in what are called the collaborative research and development programs. This makes the actual application that is put forward subject to peer review at the time the work is done.

The second stopgap I have.... If you look at the brief that I presented, all the papers in there are theses that are peer-reviewed through a university department, and the vast majority are published in the peer-review literature, which is a second check associated with that.

The other thing you have to realize is that when I'm looking at the top 60 of things like naphthenic acids, and these alkyl PAHs and dibenzyl thiophenes, you cannot purchase these from a chemical supply company. The only source of these compounds in the form that we're dealing with in the Alberta environment is through access to the waste materials of a company. You de facto can't do the work unless you get access to those waste materials through a collaborative relationship with the company. But I'll be perfectly frank. I've spent most of my career trying to maintain my independence associated with this, and frankly I've been very successful to date.

The Chair: *Merci beaucoup.*

Ms. Duncan, the floor is yours.

Ms. Linda Duncan: Thanks Mr. Chair.

Thank you. I appreciated your presentation, and I very much appreciated your “brief” brief.

Dr. D. George Dixon: I didn't want to make it too long, since I knew very well that no one would read it.

Ms. Linda Duncan: You can always count on me to read it. It was worth reading.

You discussed the baseline information. We've had operations in the tar sands now for 30 or 40 years. Does it not lessen the scientific value of a baseline if the information on the baseline is being collected 40 years after the operation has already occurred?

Dr. D. George Dixon: Perhaps I'll take a start at that. The Athabasca watershed is a relatively large area. In terms of baseline, there are two types of baselines that you're looking at. One of them is what I'll call lakes and rivers that are naturally occurring in the environment and are not underlain by oil sands. They're out there, but there are no oil sands in the deposit sitting underneath those lakes or rivers.

The second type of baseline you're looking at is naturally occurring systems where there are oil sands that are underlying the resource. The levels of naphthenic acids and PAHs will occur naturally; they're present in all of these systems. They're lower in the ones that are not underlain by oil sands. They're higher in the ones that are underlain by oil sands, and then when you get into the leases, where there's direct influence of process water, then they're very high.

To be perfectly honest, part of your question is the reason I've been trying to get—and have gotten hold of—old RAMP data to try to look at what's there. But we can still get that information by going sufficiently far away from the areas that are associated with oil sands activity, from either a groundwater or surface water area, and we can go in a wind direction that probably wouldn't be subject to atmospheric transport and deposition.

The ideal situation would be to have started 40 years ago with baseline activity. Most of my work is in what I call the impacts of base metal mining—copper, lead, cadmium, and zinc. I got into the oil sands business after I'd done quite a bit of research in this other area. In 30-odd years of working in that and in litigations on environmental activity and research, I have never had what I would call sufficient baseline data. So if you're looking to find it, it's almost never there.

I'll settle for four years of data—four consecutive years of data.

● (0945)

Ms. Linda Duncan: It does present a bit of a dilemma for sound researchers who are trying to start with the baseline and go from there.

Dr. D. George Dixon: It's a very difficult situation.

Dr. James Barker: In terms of the groundwater component, groundwater moves relatively slowly. For us, 40 years isn't a long time. The record, as it exists now, in many areas is not much different than it was 40 years ago, as long as we're away from the active operations.

Ms. Linda Duncan: But that's a presumption. In theory, that's the way groundwater works.

I don't know if you had a chance to look at the testimony of the NRCan officials who appeared before us. As you testified, now, after 40 years of working the tar sands, the Alberta government and the federal government are starting to do some studies on what the situation is for groundwater and the interface. As I recall, they had three key issues they were exploring.

One is the sustained safe yield for groundwater in that whole northern Alberta region. The other is the transfer mechanism between aquifers, and they say they have no idea—including between Alberta and Northwest Territories and Saskatchewan. The third issue is scale of time. They don't really know yet how fast it moves or what's under there. The surface-to-groundwater connection is not known, particularly the issue about the importance of the groundwater in recharging the river.

I'm presuming by your testimony that as scientists you think it's very important that we expedite that work, which would help your research.

Dr. James Barker: Yes, and I think it's recognized, as I understand it, by the province and the federal authorities that this baseline needs to be upgraded quickly. My sense is that it's much more critical in the in situ operations for hydrogeologists, because they are in the hydrogeological environment. I think that's where it's most critical to develop the baseline quickly. My sense was that they're moving ahead quite well on those fronts now.

Ms. Linda Duncan: Dr. Barker, in your brief summary you stated something that's very interesting to me. You stated that formerly, the big oil sands operations, Suncor and Syncrude, were able to site on impermeable material, but the new ones are being forced to site the tailings ponds on or near shallow aquifers with permeable land.

Would it be fair to suggest that it's probably really important to complete these studies to know what the risks are before we steamroll ahead with operations on lands that are permeable?

Dr. James Barker: My understanding is that as part of the application for those mines, they go through the environmental impact analysis. My understanding again is that those issues are captured and the companies have to identify control mechanisms and other ways to mitigate those problems. They are being addressed on a site-by-site basis.

Ms. Linda Duncan: In fact, you did mention the issue of cumulative impacts. I'm from Alberta and I've been involved in lots of discussions about the need for cumulative impact assessments. Unfortunately, it's still just talk and it's still site by site. You've clearly identified the need to be consolidating science, data, and findings. Clearly that would make it possible to look at the cumulative impacts. Well, very clearly there's a problem.

Usually the EIA approval process, of course, is the place where sound scientists like yourself would intervene and provide testimony. But based on what you're saying, it sounds like we don't yet know exactly what's happening and we don't yet have any idea of how to actually address the impacts. That's still an unknown.

Dr. James Barker: In terms of groundwater impacts, we have a toolkit, so we know how to address the local impacts. I think the cumulative impact is an important issue, and perhaps that's something Dr. Dixon can address better than I can.

Dr. D. George Dixon: Cumulative impact assessment is not a particularly easy thing to undertake. Most of the EIA's cumulative impact implications are all done based on modelling activity. You develop a model of what the potential cumulative impact would be. All models are wrong, but some are useful. What those models do is predict where you might look for an effect and what the effect would be. It's something where fellows like Jim and I would go out and try to do some work in the environment to see if the model predictions are in fact correct and whether or not we can pick up cumulative impacts.

When I say cumulative impacts, please don't assume that I'm talking strictly about the potential activities of the currently operational oil sands leases and their potential impact on the river system. I'm really talking about the pulp mills along the watershed. Fort McMurray is growing at close to an exponential rate, and—

● (0950)

Ms. Linda Duncan: It's total loading that you're looking at.

Dr. D. George Dixon: It's total loading and some of the issues associated with the release of municipal sewage treatment effluent into the Athabasca from Fort McMurray. That will contribute to metal loadings and this type of thing. It will also contribute to PAHs. The same ones that you get as a runoff from highways are the same PAHs that we're worried about in terms of oil sands activity.

There are two issues to that. One is you have to find out what the cumulative impact is, what the total impact on the environment is. Then, as a secondary, you can start partitioning that to figure out who's responsible for what. In terms of my perspective of trying to protect the environment, I'm rather more concerned about the total impact at the present time. Then we'll worry about who we're going to blame later.

The Chair: Thank you.

Your time has expired.

Mr. Braid.

Mr. Peter Braid (Kitchener—Waterloo, CPC): Thank you very much, Mr. Chair.

I thank both Dr. Dixon and Dr. Barker for their attendance today and their very thoughtful presentations. It's great to have representatives here from one of Canada's finest post-secondary institutions.

Dr. D. George Dixon: Did you expect me to comment on that?

Voices: Oh, oh!

Mr. Peter Braid: I don't think there's a need for any additional comment.

Dr. Dixon, you've been studying the issue of the impacts of the oil sands on water for about 15 years. How many times have you visited the oil sands?

Dr. D. George Dixon: I don't know, probably 20 times. I get up to Fort McMurray at least once a year, but usually two or three. I currently have two grad students and a post-doctoral fellow who are working in the area at the present time.

Mr. Peter Braid: Dr. Barker, how long have you been studying this issue and approximately how many visits have you made to the oil sands?

Dr. James Barker: I actually can't remember how long, but I've been a member of one of Suncor's review boards for about nine years. We meet at Fort McMurray three times a year. So I'm very familiar with Suncor's operation. I have two graduate students working in that area as well at the moment.

Mr. Peter Braid: I'd like to start with a couple of questions to clarify some of your presentation in your testimony, starting with Dr. Dixon.

You talked about the concept of the end-pit lake. Could you help me understand what that is? Is that an alternative to a tailings pond, or is that part of the reclamation process?

Dr. D. George Dixon: An end-pit lake is part of the reclamation process. If you take a look at the leases of the oil sands, you'll see that they have to return the leases to the control of the province in a state that they have—I think the terminology is—an equivalent ecological capacity to the pre-mine state. Now, please do not ask me to define what constitutes an equivalent ecological capacity, because in most cases people are still trying to figure that out.

If you take a look at that activity, you will see there are some things called dry landscape options, which are uplands that will be remediated and reforested. Then there are wet landscape activities, which involve end-pit lakes, and by lake I mean wetland that's probably got at least five metres of water in it. There will also be some wetlands—these are supposedly part of the plan—and then there will be streams that join these up together. When the province has accepted that they have been remediated to standard—the watershed will integrate back into the normal range of the Athabasca—I have no ability to predict when that would actually occur.

The end-pit lake is a strategy to effectively build some wetland component into this reclamation activity. Basically you take a mined-out area, you put some form of tailings in the bottom, usually mature fine tails, you then effectively put a water column on top of that, and you try to have a situation where—and this may be done through fertilizing or it may be done through planting—you end up developing a biological film at the interface on the floor of the lake. It's called the benthos, the biological film that sits between the water and the sediment. Most of these naphthenates and pHs are subject to biological degradation and they will break down through time in a water column. Some of the work I've done shows what happens and how the toxicity changes when that occurs. Effectively, you then have a situation where you have a lake that has water on the top and a naturally occurring biofilm over the material, and it should, through time, develop into a natural lake that becomes part of the reclamation strategy. This end-pit lake strategy is actually fairly commonly used to reclaim strip mining of coal in the States. The difference there is that they don't put tailings in them. This is the big question as to whether or not it's viable. In base metal mining they use end-pit lakes, but it's a totally different type of use. It's part of the reclamation strategy.

The tailings ponds you see on the leases now will not be there when the thing is done; that is my understanding. I'm not an engineer; I know nothing about how they're going to do that. All I'm trying to determine is the toxicity of the materials as one of the indications as to the viability of these systems.

● (0955)

Mr. Peter Braid: Very good, thank you.

Touching on the issue of the tailings ponds and the process-affected water in those tailings ponds, is any of your research or the research of your team looking at ways to deal with the issue of the process-affected water in the tailings ponds, to ameliorate that issue?

Dr. D. George Dixon: You're speaking from what I'll call a water and waste treatment engineering perspective, of using some type...? No. I have done some work where there have been some companies or organizations that have tried to treat some of this material with, say, advanced oxidation or something like that, and I've looked at how that has changed the toxicity of the material. But in terms of the actual engineering activity associated with changing the process of treatment, I'm not an engineer. I don't do that type of work; I look at the effect.

Mr. Peter Braid: Okay.

Has any of your research looked at differentiating the potential for airborne contaminants versus direct waterborne...? We've heard some previous testimony with respect to the potential.

Dr. D. George Dixon: I'd love to play with Dave Schindler's data set, to be perfectly frank. Dave is a good colleague and I may have to get together with him.

I have not looked at airborne transmission. To be perfectly honest, I would love to be looking at airborne deposition to waterborne environments. I have an application that may go somewhere fairly shortly.

Mr. Peter Braid: Turning to you, Dr. Barker, you mentioned in your presentation that there are some examples not of seepage from tailings ponds but of seepage from dikes. Just to clarify, is the seepage from the dikes a direct result of the water in the dikes or is it from the material that has been used to construct the dike?

Dr. James Barker: Yes, it's actually both.

Mr. Peter Braid: It's both. Okay.

Dr. James Barker: The dikes are constructed mainly of sand. To my mind, it is a bit of an engineering feat to construct dikes that work out of sand, and they do. They are constructed out of sand, and the sand is delivered to the dike with process-affected water from the tailing stream. The pore water in the dike contains the same water as the pond does.

Mr. Peter Braid: Is any of the seepage coming from the tailings pond, then?

Dr. James Barker: In the best studied example, and the oldest one, which is Pond 1, Tar Island dike, the modelling suggests that about 3% of the water might be coming from the pond and 97% from the dike.

Mr. Peter Braid: That's interesting.

Do you have any recommendations on how to address or prevent seepage from the dike?

Dr. James Barker: We've done a small study for one of the companies on one of their existing dikes. From that, we identified that in fact process-affected water was able to get beyond their ditch, which was their collection system. Fortunately, they had another ditch further out that seemed to be collecting everything.

We were advising them that if they were going to rely on this single-ditch system, they should pay a little more attention to the possibility of groundwater underflowing it, meaning going under it. A critical issue seemed to be maintaining the ditch. Sand gets blown in, and it stops operating as effectively as it did. We've identified those issues as something they can do during operation to limit the impact they might have.

The Chair: Thank you, Mr. Braid. Your time has expired.

Mr. Trudeau, you can kick us off on a five-minute round.

Mr. Justin Trudeau (Papineau, Lib.): Thank you.

I'll go back a little with both of you.

Dr. Barker, you work with Suncor as well. Dr. Dixon, do you have any associations with oil companies?

● (1000)

Dr. D. George Dixon: I don't have any in a consulting capacity at the present time, nor have I had any in the last.... Actually, this whole exercise started 15 years ago with a three-day consulting job to look at the potential for the presence of some toxic chemicals. I said that, yes, there were some, and pointed out some issues. I thought this area might be something to research. Since that time 15 years ago, it's all gone through the university to support graduate education.

Mr. Justin Trudeau: Thank you.

I'm trying to get a sense of the general conclusions that you're both bringing forward as scientists. We have no detailed overall sense of the impacts on the environment right now. There are a lot of gaps in our knowledge.

Dr. D. George Dixon: We have information about specific areas. If you were asking me whether there is a surface water release from the Athabasca oil sands that is causing an impact in the Athabasca watershed, I would say no, because there is no surface water released to the system. Is there a groundwater release? Yes, I know of probably two areas where there could be a groundwater release. Is it of sufficient volume and magnitude to cause an impact? I would suggest possibly not, but there might be further research needed in that area to determine that.

In terms of aerial transport and deposition, that area has not been widely explored at all, and I could not give you an opinion on that aspect.

Mr. Justin Trudeau: There are still a lot of unknowns in creating the big picture around water and the oil sands.

One thing I do get is that there's no sense of the long-term cumulative impacts yet. We're just trying to catch up. We don't really know where we're going on that.

Dr. D. George Dixon: Exactly.

Mr. Justin Trudeau: In the idea of the end result of returning this land to ecosystems—services, capacity—we really have no sense of what that's going to look like.

Dr. D. George Dixon: We have done what I would say is preliminary information. Please understand that on the Syncrude lease there are seven ponds that were constructed with waste material and different overburden, and those have been followed for years. This demonstration pond was built afterward. There are a couple of consolidated tailings wetlands that people have looked at. What we haven't done is scale up to the next scale. That's the next step, and, frankly, it's the logical step.

Mr. Justin Trudeau: As a scientist you're keenly aware of the difference between what you can do in a controlled laboratory environment and what happens when you go up to full scale.

Dr. D. George Dixon: I do a lot of field work, believe me. Yes.

Mr. Justin Trudeau: We're basing an awful lot on our capacity to scale up, although we know that there are huge unknowns that are going to kick in as soon as we get there. There really is no overall sense of the impact of the oil sands on water and where we're going to be in 50 or 100 years. Well, maybe we can get an overall sense of it and be concerned, but there are no facts around it. Until we get to the long-term time, we can't know what's going to happen.

Dr. D. George Dixon: The modelling that has been done is sufficiently complex that the only way you're actually going to find out if something like an end-pit lake works is to build one and monitor it for about 10 to 15 years and determine whether it will work.

That's what's being done at Syncrude and at Suncor. Remember that it's up to the companies to remediate. So, frankly, if that strategy doesn't work, the province is not going to accept the lease lands back and they're going to have to go back to looking at alternative strategies.

Mr. Justin Trudeau: That seems perhaps not in the best long-term interests of the citizens of Alberta, for example, and the wildlife that lives there, that we're banking on capacity to do something that's never been done before and never successfully proven, and we're banking an awful lot on that.

Dr. D. George Dixon: I would suggest that is perhaps correct. Having said that, please understand that there's been sufficient activity up there now that there is already a huge amount of area that needs to be reclaimed and something has to be done about it. So if we take a look at this strategy now, it has to be done. It's not like we can stick our heads in the sand and leave town. There is significant damage there already that we have to deal with.

● (1005)

Mr. Justin Trudeau: We don't even know yet, as you say, what the equivalent ecological capacity of our goal would be in terms of the lands, the services, the wetlands, the dry lands, and what they are offering.

We really don't know where we're going with this.

Dr. D. George Dixon: I can give you a definition of what I think an equivalent capacity would be for a lake, but whether or not all aquatic scientists would agree with me and whether or not that would be acceptable to the regulatory authorities in the Province of Alberta is a different matter.

I won't bore you with telling you what I think it is now.

The Chair: Thank you, Mr. Trudeau. Your time has expired.

Mr. Calkins, the floor is yours.

Mr. Blaine Calkins (Wetaskiwin, CPC): Thanks very much, Mr. Chair. I certainly appreciate having an opportunity to ask a few questions.

I'm going to start with some general questions, and then I'm going to talk to you about fish, because I have a zoology degree in fisheries and aquatic sciences, Dr. Dixon, and I'm going to ask you some fairly direct questions about fish, if I have time.

The first question in the line of questioning I want to follow, though, is dealing with the scientific independence. You have been quite clear, Dr. Dixon, that you are obviously balancing the various sources of funding that come to you and you're maintaining scientific independence. I'm going to ask you directly if the oil sands companies or anybody like that ever tried to influence the direction of your research as part of their funding arrangements.

Dr. D. George Dixon: No.

Mr. Blaine Calkins: Dr. Schindler was very clear in his testimony before the committee when we were in Edmonton that he did not want to take any funding from the oil sands companies, which implies that anybody who's doing science at the behest of the oil companies doesn't have that independence. Would you care to comment on his comment?

Ms. Linda Duncan: A point of order, Mr. Chair. I don't think Dr. Schindler ever suggested that.

Mr. Blaine Calkins: That's a point of debate. The transcripts clearly show that.

Ms. Linda Duncan: He said he prefers to be independent—

The Chair: That's debate.

Mr. Calkins, please continue on.

Ms. Linda Duncan: You are attributing something inappropriate to Dr. Schindler.

Mr. Blaine Calkins: Mr. Chair, I have a question—

The Chair: Yes, there is a question on the floor.

Mr. Blaine Calkins: If that question is deemed appropriate by the chair, fine.

Dr. D. George Dixon: Dave Schindler and I are research colleagues; I would suggest that we are friends. I am not going to make a comment on why Dr. Schindler does or does not take money from industry. That's up to him.

Mr. Blaine Calkins: Fair enough.

Dr. D. George Dixon: I will make a comment, though, that you perhaps would appreciate. Up until three years ago, trying to get resources to work on these chemicals was not a particularly easy thing to do. The oil sands have had a great amount of publicity over the last three or four years that has made the availability of research funding quite easy to come by.

Believe me, when I was originally starting to find money to look at the toxicity of these compounds called naphthenates that nobody had ever heard of, and they weren't really all that concerned about whether or not it was an issue, people were not lining up at my door with truckloads of money.

Having said that, my standard is that I publish it in the peer-reviewed literature. I've published over 25 papers in the oil sands area, and no one has ever questioned from the industrial side as to whether or not it was appropriate that I publish it.

Mr. Blaine Calkins: Just for clarification, Dr. Schindler was one of my professors when I went to the University of Alberta. It's not a slight on Dr. Schindler. It just seemed to be a differing approach on where the researchers were getting their funding.

Dr. D. George Dixon: Exactly. It's called academic freedom. He's allowed to look, make his decisions, and go from there.

Mr. Blaine Calkins: Dr. Barker, in your testimony you said that researchers at the University of Alberta and the Alberta Research Council are leading one such research effort in dealing with some of the new seepage studies. Could you identify to us who some of those researchers are?

One of the things I'm not satisfied that we've done a thorough job of investigating, as a committee, is that we haven't had anybody from the reclamation side of things, a real expert on reclamation, testify before the committee.

Could either of you identify who you think could or should be appropriate? You've seen who has testified before the committee already, I'm sure, by reviewing our meetings. You don't have to answer right now, but if you could give it some thought and maybe get back to the committee with that, I would really like to hear from somebody along those lines.

Dr. Dixon, about fish, after your briefing.... A lot of your citations dealt with studies that dealt with *Perca flavescens*, which is yellow perch. They don't normally exist in rivers, so I'm assuming that these are in some of these test ponds where these things are being studied in a closed environment.

Dr. D. George Dixon: Yes.

Mr. Blaine Calkins: When we were up at Fort Chip we heard anecdotal evidence from the fishermen and the locals who were there. I asked some questions about diseases and so on.

You know what lymphocystic is.

Dr. D. George Dixon Yes.

Mr. Blaine Calkins: You know what dermal sarcoma is.

Dr. D. George Dixon: Yes.

Mr. Blaine Calkins: It's quite common in *Stizostedion vitreum* or the walleye populations and so on.

Do any of those diseases or any of those parasites cause deformations or abnormalities in fish?

● (1010)

Dr. D. George Dixon: I'm not a fish pathologist. I can't tell you off the top of my head that they do or don't. I have never seen an increased incidence of those in some of the fish sampling that I've been doing.

The yellow perch stuff that we're looking at has to do with lake environments, as opposed to the riverine environments that are in the area. There are lakes all over the place up there—please understand that—

Mr. Blaine Calkins: Absolutely.

Dr. D. George Dixon: —and you'll find yellow perch in them.

One of the indicators that we were trying to use at one point in time had to do with some lymphocystic-type stuff in fat-head minnow, but it didn't sort of pan out as being reliable.

Frankly, I don't want to waste your time. I don't have a clear answer for you.

Mr. Blaine Calkins: Fair enough.

The Chair: Your time has expired, Mr. Calkins.

Thank you.

Dr. D. George Dixon: I wasted it anyway. My apologies.

The Chair: *Monsieur Ouellet, vous avez cinq minutes, s'il vous plaît.*

[*Translation*]

Mr. Christian Ouellet (Brome—Missisquoi, BQ): Thank you, Mr. Chair.

I want to thank both of you for coming here today, it's important for you to be here. I'm going to speak to Mr. Dixon first.

In listening to what you said—particularly you, Mr. Dixon—I got the feeling that you were somewhat uncomfortable on a scientific level, if you see what I mean. You are uncomfortable with regard to the oil sands project.

Is this the first time that you are expressing this discomfort? Have you done so elsewhere? Are you saying that, scientifically, we are not able to come up with something concrete? Have you made recommendations to change this? Have you recommended that more money be invested in research? With regard to research, I know that it's also a matter of time; it's not just a matter of money. Is it your opinion that the oil sands project is moving forward too quickly? Are there too many projects? Is it well-regulated enough?

You are experiencing some discomfort as a scientist. Have you spoken publicly about this feeling?

[*English*]

Dr. D. George Dixon: I actually don't know how to answer that one, in some ways. The discomfort I have is not in the actual nature of the work that is being undertaken; the discomfort is in what I would call other areas that I know should be explored but for which there are not sufficient human resources, frankly, in the academic community in Canada to address all of the issues at the present time.

I have, on a number of occasions, made comments to individuals within the province of Alberta about what I think are the research needs in the oil sands. Two weeks ago, I gave a one-and-a-half-hour seminar to colleagues at Environment Canada, trying to encourage them to become involved to a greater extent in oil sands activity. I'm giving a web seminar to colleagues in the Department of Fisheries and Oceans in about two weeks to outline some of what I feel are the issues.

A lot of this has to do with what I said earlier, that up until two or three years ago the level of interest in this was not what it is now. So I've often, frankly, undertaken to encourage colleagues to join me in working in the oil sands on different appropriate issues.

There is a consortium. Please understand that some of the papers I've reported here were done with colleagues from Environment Canada. There are people from the University of Guelph, the University of Windsor, the University of Saskatchewan, and the University of Alberta who have participated in this.

Now, have I made pitches in the media with respect to more money for oil sands work? No. I find, frankly, that as a research scientist that is a particularly ineffective way of trying to influence people to give you further resources. I would suggest that perhaps fora like these, or talking to people who are controlling research funding more directly, are more productive.

So it's not a discomfort with the science that is done in the majority of cases, particularly that which is done in a peer-reviewed fashion. It's a discomfort in that there are probably more questions that need to be asked than we're fully drawing our attention to at the present time.

[*Translation*]

Mr. Christian Ouellet: Have you told the governments responsible—the Government of Alberta and the federal government—that you feel such discomfort? Have you said that we are unable to know just how toxic this project will be later? You and Dr. Barker talked about the water table. You said that 40 years was a short amount of time for the water table. So you're looking really far into the future.

Do you regularly say that, at present, you are unable to predict what will happen with the oil sands, what the end result with be?

● (1015)

[*English*]

Dr. D. George Dixon: I would say that it's a fair comment that when I'm making presentations with respect to this topic, I let it be known that there's a great degree of uncertainty around the end points that I'm discussing, yes.

[*Translation*]

Mr. Christian Ouellet: Are you invited to take part in environmental impact assessments of new projects? Are you both asked to testify during such environmental impact assessments?

[*English*]

Dr. D. George Dixon: I have never participated in the preparation of an environmental impact assessment. I have reviewed parts of EIAs for Environment Canada on occasion.

Dr. James Barker: And I've never been involved in any EIAs.

[*Translation*]

Mr. Christian Ouellet: So that means that you never share your concerns about the toxicity or dangers of the processes involved. You have never said that during an environmental impact assessment; you have never had the opportunity to do so.

[*English*]

Dr. D. George Dixon: EIAs are making what I would suggest would be statements about future activity. In order for me to undertake toxicity work, the mill has to be operational and I have to have some of the materials that they're working with to be able to do the toxicity work. In fact, when I have reviewed them, it has been with respect to their toxicity estimates and whether or not I thought they were reasonable. The models are there, they stay what they are, but frankly, you can't really tell what the toxicity of something is until you have something to expose organisms to.

The Chair: Mr. Woodworth, you're next up.

Mr. Stephen Woodworth (Kitchener Centre, CPC): Thank you very much.

It has been extremely interesting, gentlemen, and I thank you for coming to our committee.

I think it's challenging for those of us who are not scientists, because a lot of the terminology that's used is hard to grasp. There have been suggestions that there are gaps in our knowledge and that there's inadequate information. Of course, that's sort of the continual state of science, isn't it? We never know as much.... If we knew everything, we could just put down our tools and stop studying. Correct?

Does that surprise you, that there are gaps in our knowledge?

Dr. D. George Dixon: It doesn't surprise me. I've been doing environmental risk assessments for the mining industry for a long time. I've appeared in litigations for a number of different agencies looking at damaged environments, and I never have enough data.

Mr. Stephen Woodworth: So let's take that as a given. Scientists probably never have enough data, and I understand that. But I seem to get from your presentation that even though we don't know 100% about this earth of ours, there's really quite a wealth of information about water and the oil sands. There's so much that you've identified the need to catalogue all this information as a high priority. Am I getting that right?

Dr. D. George Dixon: You're getting that right in a sense, but I'm interested in cataloguing to further solidify and define the areas where we don't know what's going on, and then attempt to direct our activities into those areas.

Mr. Stephen Woodworth: Right. If I understood you correctly, there's been an increase in funding and other resources for research in this area over the last three years. Is that correct?

Dr. D. George Dixon: That's a fair statement, but I don't have a budget sheet in front of me showing the cashflow to this research sector. There's certainly much more interest in undertaking research than there was, and I suspect there's more cash available.

Mr. Stephen Woodworth: Do you happen to know what role, if any, the federal government has been playing over the last three years in facilitating that increase in research?

Dr. D. George Dixon: I do not know anything about the internal A-base funding within either Environment Canada or Fisheries and Oceans in this area.

● (1020)

Mr. Stephen Woodworth: I understood you to say that every oil sands project that gets started is studied for impacts of its operation under the environmental impact assessment. Is that correct?

Dr. D. George Dixon: That's correct. In order to get a permit to operate, there has to be an EIA.

Mr. Stephen Woodworth: May we safely assume that those EIAs for each project are done scientifically and with appropriate data, to your knowledge?

Dr. D. George Dixon: They're done with data in order to make the model predictions on what the outcome will be, but you're dealing with an industry that is evolving very rapidly in the techniques that are being used. If you look at the EIA that was originally filed for Suncor, I don't think you'll find mention of consolidated tails in there, because that's a new technology.

So there's enough information available in the EIA document for society to make a decision as to whether or not they want this to go forward, but the EIA documents are not chipped in stone by any stretch of the imagination. They are societal decisions based on what's in that EIA.

Mr. Stephen Woodworth: I think I understood you to say that the only way to really verify whether the modelling being done bears out is to build it, monitor it, and then assess whether it matches the model. Is that correct?

Dr. D. George Dixon: That's correct. And if I'm reviewing an EIA there's always the assumption that the modelling prediction will be met, but I look for plans B and C and ask, “So if this doesn't happen according to plan, what are you going to do about it?”

Mr. Stephen Woodworth: Excellent.

I would like to ask Dr. Barker to interpret something for me, if I may. In his written presentation there is a statement regarding "investigating the potential for process-affected groundwater to leach toxic trace metals from the sand aquifers and so mobilize the metals towards surface water bodies". He further says, "To date, while metals such as iron and manganese appear to be mobilized, the toxic trace metals, including arsenic, do not appear to be enhanced in the plumes".

So your studies have indicated that toxic trace metals are not transported by groundwater to surface water in the areas you've studied. Am I getting that right, or is it something else?

Dr. James Barker: I think that's partly correct. The other aspect is there's a possibility that some of the trace metals may exist in the aquifer itself and are taken out of the aquifer, put into water, and delivered to the surface water. We haven't seen evidence of that occurring either.

Mr. Stephen Woodworth: Dr. Dixon's report says that reproductive studies on the Athabasca River and tributaries have provided important baseline information.

When was that baseline arrived at?

Dr. D. George Dixon: That work was published in 2003. I think it was done in 2001.

The Chair: Thank you.

Mr. Woodworth's time has expired.

Mr. Watson.

Mr. Jeff Watson (Essex, CPC): Thank you, Mr. Chair.

If I don't use my full amount of time, I'll be deferring some to Mr. Calkins.

Welcome to our witnesses. We are currently studying the oil sands and their impact on water.

We've talked quite a bit about water quality today. We haven't talked very much about changes to the topography. We did a flyover as a committee. Those of us who were there actually participated in a flyover, and we got to see some of the reclamation work that has commenced. We are told—although they have yet to quantify for us how much—that the pace of reclamation will be increasing over the short term.

But even with reclaimed land, if you will, and with reclaiming the tailings ponds, for example, there are changes to the topography. The wetlands are not in the location that they were. You're changing the physical geography with these tailings ponds—stacking.

What impact does changing the topography have on the movement of water in the basin?

● (1025)

Dr. James Barker: The movement of water, to a large extent, for groundwater at least, is controlled by the topography, so the shallow groundwater flow is, in large part, controlled by the topography. By engineering the topography, you have the opportunity to have some control, at least, over those flows. So it becomes not just a challenge but an opportunity to try to reform the landscape in a way that leads to successful reclamation.

Mr. Jeff Watson: Do you want to offer any comment?

Dr. D. George Dixon: No.

Mr. Jeff Watson: Is there a risk perhaps that water within the basin will move out too quickly to be captured? Is that something that—

Dr. James Barker: Certainly those are the risks that challenge the reclamation people. Letting that water move out by erosion has to be prevented. There are a number of issues in reclamation involving that topography that will impact water. And water does impact the topography as well. That interchange, I think, is now well recognized among the people practising the reclamation. That's not necessarily fully recognized, but I think they're now looking at water management as part of the reclamation management.

Mr. Jeff Watson: With regard to the concept of compensation lakes or compensation wetlands, they won't be located where original lakes or wetlands have existed. What does that do to the relationship with respect to surface water and groundwater? What kinds of changes can we anticipate from that?

Dr. James Barker: Certainly, it changes it. I guess I would put it another way. I would ask whether there are certain benefits to engineering certain types of change. For example, the groundwater research was undertaken in the hopes that remediation of the toxicity would occur during groundwater flow. If that had been borne out, then you might encourage more groundwater flow and less surface water flow in the reclaimed landscape.

I look at it more as an opportunity—since you have to re-engineer the landscape—to try to re-engineer a landscape that functions as well as you can make it.

Mr. Jeff Watson: Are you suggesting we can re-engineer better than nature itself?

Dr. James Barker: I'm not suggesting that at all. I'm saying that we have to—

Mr. Jeff Watson: Okay. You have to be careful there.

Dr. James Barker: Well, I don't know. We haven't seen it yet. We have to re-engineer. We have no choice. You have options in re-engineering. I look at it that way. It's not comparing yourself against nature, other than in the mandated way. I don't think there's any inclination of restoring the landscape.

Mr. Jeff Watson: Okay.

I'd like to give the last minute to Mr. Calkins, if I could.

Thank you.

Mr. Blaine Calkins: Thank you, Mr. Watson.

I would just like to ask a question.

The Canadian Water Network is anxious to play a role in the recommendation that you provided, Dr. Barker, insofar as the symposium goes. Could you just elaborate for us what you—and perhaps Dr. Dixon as well—would envision that looking like? Would it be something that would meet every two years? Where would you meet?

It's a very good recommendation. I would just like some visionary elaboration on that. The recommendation, hopefully, will show up in the report. It'll be vague enough that somebody can use it to do what they need to do. But I would like, for the record, some testimony, from your knowledge, because I'm sure you participate in numerous forums and sharing of information. Could you just elaborate for the committee what either of you would envision this looking like?

Dr. James Barker: Although it's in the early stages, we would imagine an annual workshop in Alberta, of one to two days, at which research would be presented in some organized fashion. There would be quite a few poster displays so graduate students could expose their research to people. The workshop would be supported by the companies, Alberta Environment, the Alberta Research Council, the Canadian Water Network, and anybody else who thought it was a good idea.

There would be an attempt to collect at least some ideas, from new tailing strategies, surficial reclamation interests, and water treatment options through to hydrogeology, hydrology, and aquatics. It's very difficult to organize such a broad meeting and have information exchanged in a day and a half, let's say. So it's a real challenge. But that was our view of what we needed. We needed to talk to the engineers and ecologists, or at least have them in the same meeting room for a day so we could bump into them at coffee, if nothing else.

The Chair: Thank you, Mr. Calkins.

We'll go to Mr. Warawa.

● (1030)

Mr. Mark Warawa: Thank you, Chair.

A number of the questions I had have already been asked and answered.

I want to thank you for being here. This has been very enlightening. As has been shared, we took the trip. I've learned over the years that firsthand experience on the site is really edifying. It helps us to understand. It was good to hear that you'd been there many times yourself.

In my past life, I was on city council for about 14 years. Often we would go out to see the site. In the area around us we had some very large mounds of gravel that were removed, and then the area was reclaimed. The end result was an improvement on what was there before. You now have very productive agricultural land where previously it was great mounds of gravel. As you suggest, there are opportunities to improve.

One hurdle we dealt with in local government was the company that would maybe mine that resource. There was not adequate security to make sure it was reclaimed adequately.

My first question focuses on reclamation. Dr. Barker, I think you mentioned that if it's not designed properly, if it's not functioning properly, the province may not want it back. What guarantees are there that the work will be completed and that there will be security to make sure it's done properly and meets the province's standards?

Dr. James Barker: If the companies are operating, there is some guarantee that they still have cashflow that can be directed to the reclamation. My sense, and I'm not an expert on reclamation, is that we're moving away from an immediate and sudden handover—it's mine today and yours tomorrow—to a view that there might be some ongoing care. Perhaps we can do the reclamation better if we don't depend on handing it over completely. Rather, we depend on handing it over with some ongoing maintenance, let's call it. I like that idea. I'm not an engineer. I don't believe that engineers solve things perfectly. So I can imagine that there would be some additional costs.

We're not experts in bonding and things like that. Gravel extractors often have to post bonds. The industry, at the moment, as I understand it, doesn't post bonds.

It's an area of policy that I think people face, and I guess, as Dr. Dixon said, it's a matter of demonstrating these remediations before we can develop confidence that they can actually be carried out.

Mr. Mark Warawa: Further to that, when we did our flyover, we saw some areas that were reclaimed. We have vegetation growing. They are not ponds. Are there reclaimed areas that you think have been done well?

Dr. James Barker: Syncrude, I think, has made application, and one small area has been accepted. Suncor is advancing some to get accepted. But those have not been the troublesome areas of the ponds and other challenging areas. I'm not aware of any that have actually been demonstrated and handed over.

Dr. D. George Dixon: In my understanding, there have been no aquatic entities that are deemed to have been reclaimed.

Mr. Mark Warawa: Right. So the end-pit lake strategy is still in process. We flew over actual areas where a tailing pond has been filled in with the white sand and others that were in process, where you end up having sand where there used to be an open-pit mine. You now are taking overburden from another area that's being stripped off and putting it into place. It has seeds in it and it starts regrowing fairly quickly. Is that what you're referring to?

Dr. D. George Dixon: No. That would be a dewatered tailing site, probably a sand dump of some kind. What I'm talking about are aquatic areas that have been reclaimed. Nobody has suggested that this pond or wetland has been reclaimed. So I'm not talking about uplands stuff at all.

Mr. Mark Warawa: Okay.

I'm going to switch gears quickly, because my time is running out. On the trip, we went up to Fort Chipewyan and we heard a lot of concern about perceived health problems being caused directly by the oil sands. Is there certainty that there are toxins that are being introduced into the Athabasca and Lake Athabasca, which are directly related to the oil sands operations?

● (1035)

Dr. D. George Dixon: Well, there are groundwater inputs to the Athabasca that are there; I mean they're documented. We don't know what the aerial transport depositions are in terms of surface waters. In surface water inputs there aren't any. It's quite obvious there are issues around the health community around Fort Chip, but I don't know what's causing those problems.

By the way, I'm not suggesting it isn't the oil sands; I'm just saying we don't know. I would worry more about trying to determine what the health issues are in Fort Chip and then go back after and look at that.

The Chair: Okay, thank you. Your time has expired.

Dr. Dixon, in your research, though, you're talking about the cumulative impacts on surface water.

Dr. D. George Dixon: Yes.

The Chair: So you're looking at the impact of, as you said, the oil sands, the reclamation projects, and any ongoing future impacts that they're going to have—as well as Fort McMurray and other agricultural and industrial uses in the area.

We were told by some of the witnesses that there is even natural pollution occurring because the oil sands come right to the surface in the riverbed itself. Is there any way of measuring those natural impacts?

Dr. D. George Dixon: Yes. In fact, you'll find that in some of the papers I have here that were done looking at slimy sculpin in a couple of these rivers...we suspect those may be impacts on fish that are occurring as a result of the natural levels of materials that are present in the system. I can show you streams up there that look as if the bottom of the thing has been paved. It looks as if it's been paved; it's eroded bitumen with the stream running over it. The trick is that the contaminants you see that are associated with oil sands exploration and exploitation are exactly the same contaminants that are there as a result of natural weathering.

So the question arises whether the naturally occurring compounds are having an effect. We have some indications that in some places they may be high enough that they are. Now the beauty of that, of course, is that it tells you what to look for when you're looking for an anthropogenic impact.

The Chair: Thank you.

We're now going to go to the third round. Mr. Scarpaleggia, could you kick off?

Mr. Francis Scarpaleggia: Thank you very much.

You say there are pulp mills up there and they may be contributing to toxicity or pollution of the water. But my understanding was that as a result of the pulp and paper effluent regulations, pulp mills have kind of closed systems now and they're not really letting anything into the water. Is that correct?

Dr. D. George Dixon: Yes, the pulp mill systems have come a long way. They're not totally closed systems. They do have input of aquatic effluent. But you have to remember cumulative impact. They've been active for a period of time, so there may be stuff that has been deposited into the sediments when they were open earlier that could still be an issue. But the contaminants you see associated with pulp mills are not the same as the contaminants you see associated with oil sands, and I didn't mean to imply they were.

Mr. Francis Scarpaleggia: Okay.

You said there were two groundwater inputs into the Athabasca. If there were deleterious seepage from tailings ponds and some water was seeping into the groundwater, and if that groundwater was highly polluted, would it be entering the Athabasca through those two groundwater inputs? Now this is a scientifically naive question, I understand, but if we know there are two inputs into the Athabasca, if we know that seepage water from the tailings would be entering the Athabasca through those inputs, why don't we just park ourselves at the inputs, if you will, and do some research and see what's coming out there?

Dr. D. George Dixon: I have.

Mr. Francis Scarpaleggia: And you say there's no problem?

Dr. D. George Dixon: I said there were at least two seepages. In any information that I've seen, within about 20 feet in the river from where the seep goes in, you can't pick up a chemical trace.

Mr. Francis Scarpaleggia: Environmentalists tell us there's seepage into the Athabasca from the tailings ponds. You're saying that, based on your research, it's insignificant with respect to pollutants.

Dr. D. George Dixon: No, I didn't say it was insignificant. I said I couldn't pick it up chemically. I don't know if I could pick it up from a biological response in organisms. Remember, I said there were two areas of uncertainty. There was no surface water input, but there could be groundwater input and aerial transport and deposition that we don't fully understand.

● (1040)

Mr. Francis Scarpaleggia: What can we do? Can we do some research on the biota and the aquatic species to come to a conclusion about this? This would seem to me to be the priority, from a public policy perspective. It's all about tailings ponds and if they're seeping into the Athabasca, yet we seem to be avoiding this issue as if it were the elephant in the room. You've done some research, but apparently you're not prepared to make a categorical statement until the last bit of research is done. Why isn't this being done?

Dr. D. George Dixon: We have done sufficient work that I'm relatively sure that the groundwater inputs into that system are not having a significant effect. But the uncertainty around that is about 20%.

Dr. James Barker: There has been monitoring—aquatic chemistry monitoring and aquatic effects monitoring. The seepage that we've noted from Tar Island dike and Pond 1 on Suncor's land has been monitored for a number of years and reported to Alberta Environment. Whether that monitoring is of good quality, I can't say, but there has been at least some monitoring focused on that area.

Mr. Francis Scarpaleggia: First, why is it being left to the companies to monitor this important link in our possible conclusions about the impact of the oil sands on the Athabasca and downstream?

Second, I seem to have read that in its last budget the Alberta government cut funding for well monitoring. Is that well monitoring in the oil sands area?

Dr. James Barker: There are so few wells that the province could monitor in the oil sands area that I don't think this pertains to the oil sands.

Mr. Francis Scarpaleggia: Don't you think it's odd that the industry is monitoring itself on such an important issue?

Dr. D. George Dixon: I'm not going to comment on the appropriateness of government policy in that area, but in the majority of cases in which there is material being released from the industry into a receiving environment, it is up to industry to do the monitoring under the surveillance and audit of either the provincial or federal government. It has to do with the amount of human resources available within those ministries. Don't get the impression that the companies have a licence to run wild. From what I can see, the audit procedure is pretty rigorous, but there could be problems with it. I'm not a regulator.

The Chair: Thank you.

Monsieur Bigras, s'il vous plaît.

[*Translation*]

Mr. Bernard Bigras: Thank you, Mr. Chair.

Mr. Barker, I'd like to come back to the study conducted by your graduate students. It is mentioned on page 7 of the brief you presented. They analyzed three sectors where water contaminated by processes infiltrated groundwater.

In response to Mr. Woodworth, you confirmed what you had written in your report, and I quote:

> The other two plumes created groundwater contamination on operator leases, which does not threaten surface water bodies.

That is basically what you told Mr. Woodworth. However, you added the following:

> Unfortunately, the major toxicants, naphtenic acids, do not show significant biodegradation in these plumes. Attenuation appears to be by slow dilution with natural groundwater.

First, what then is the level of toxicity observed?

Second, when you talk about slow dilution, what do you mean by that?

Third, what are we then to conclude for the future, particularly with regard to that plume?

[*English*]

Dr. James Barker: Each plume is a bit unique. In fact, one plume is extending into an area that will be mined out, so it will be returned into the pond systems. Another area occurred at a pond that had a potential to impact surface water. The pond was reclaimed and that impact was eliminated, at least in the long term. There is one plume that is still out there that probably has tens of years before it will approach any surface water body. I'm not sure what the company is going to do, but one approach would be to continue to monitor that plume to see if in fact this slow attenuation reduces the toxicity effectively.

Dr. Dixon has worked on some of the toxicity studies. I'll ask him how toxic the water is.

● (1045)

Dr. D. George Dixon: I don't know what the concentration of naphthenic acids is in the particular plume he's talking about. If I were to know that, I could give you an estimate.

A voice: Around 20.

Dr. D. George Dixon: If it's about 20, the threshold of impact for naphthanate seems to be around 11 or 12 milligrams per litre. So 20 could probably have a marginal effect if it were released into an area where there were larval fish or something like that.

The other comment I should make is that naphthanates change in structure as they age. The ones that are very young and have only just come out of bitumen and have not been exposed to the environment and microbial degradation are more toxic than the ones that have weathered for three to five years. I'm assuming at 20 milligrams per litre it is new stuff that hasn't been subject to atmospheric degradation.

The Chair: Ms. Duncan.

Ms. Linda Duncan: Thank you.

This has been very helpful, and I appreciate your testimony.

Are either of you aware of the research that Dr. Schindler just finished and testified on? He's completed some initial ones, although he fully endorses your call for a more comprehensive, expertly designed and executed year-round multi-year study.

Dr. D. George Dixon: It sounds like I plagiarized.

Ms. Linda Duncan: He testified before us on the initial results of the studies he's been undertaking—he, Dr. Donahue, and others. He looked at snow deposition, and I think they also looked at fingerlings downstream of the plant. He found higher levels of the toxins in the downstream fish, to the extent I think that the fingerlings die. As I understand his testimony, he is suggesting that clearly shows there is leakage. Secondly, the results of his snow deposition are leading him to believe that a big part of the contaminant level may be coming from airborne.... He recommends a lot more intensified study on what's happening to the airborne emissions.

Dr. D. George Dixon: That's probably consistent with what I've said in terms of aerial transport and deposition.

We have found impacts on larval fish. In the environment we found impacts of PAHs and naphthanates in lab studies. I have not seen the data. Dr. Schindler was presenting preliminary data in his laboratory that he hasn't worked up and published yet. As I said, I think I'll probably give Dave a call and see if I can take a look at it.

The thing that most interests me there is that he's finding significant levels of metals, of mercury and arsenic. I have never found any indications of mercury, and very minimal indications that arsenic is a problem in either the water or sediment data that I've looked at. I want to know where that's coming from; that's what I'm basically interested in.

Ms. Linda Duncan: That seems to be the question. My understanding is that they're finding higher levels of those when you get to Fort Chip. We asked a number of questions, and one of them was on calcium. He didn't think it was coming from the plant but from somewhere else.

On the basis of those initial findings, he's suggesting that it may be appropriate to start taking a closer look at the airborne rather than the concentration on the tailings ponds.

Dr. D. George Dixon: Once again, there's no presumption that those airborne materials are coming effectively from the activity within the watershed. There's near-field air contamination and far-field; we simply don't know.

Ms. Linda Duncan: There are still lots of unknowns.

If you were going to recommend the next round of science for, say, the next ten years, where would you recommend the concentration or federal funding sources be directed, for example?

Dr. D. George Dixon: This goes, to a certain extent, to some of the discussions you've already had. In terms of the ongoing research on the leases and remediating the activity, in my opinion, that is the responsibility of the companies. They're the ones who should be doing it, and they should be informing government of the work that's going on for collaborative activity.

I would suggest that the focus of federal government funding should be on what I call distill impacts, or impacts in the environment off the leases: what are the atmospheric implications, what are the issues associated with naturally occurring oil sands, and what are the appropriate long-term baseline studies that should be done in that area? So I would focus federal government funding in that area.

Perhaps I should declare one very, very old conflict of interest. Between 1980 and 1981, before I joined the University of Waterloo, I worked for the Department of Fisheries and Oceans.

● (1050)

Dr. James Barker: Could I add another area to that?

I think the federal government's resources, as you've heard from Natural Resources Canada, were in a geological area. The aspect that we don't touch upon is the in situ producing areas. I think the survey has skills that could help the Alberta Geological Survey in that area.

So if you're going to do subsurface work, I would recommend that it be focused on the in situ areas.

Ms. Linda Duncan: One of the significant issues that Dr. Donahue and Schindler raised is the capacity of the river to deal with increased loading, as the long-term forecasts already foresee major declines in the Athabasca River in the future.

So have you been taking a look at the level of contamination—even if it's small seepage or airborne contamination—and what will happen when the absorption capacity of the river is reduced?

Dr. James Barker: I haven't.

I don't know if Dr. Dixon has worked on the big picture of that.

Ms. Linda Duncan: Is that an issue that should be looked at?

Dr. D. George Dixon: Yes, and I've looked at it.

In my “Key Concerns to be Addressed”, number one is:

> Can the system accept additional loading from industrial activity or do the naturally occurring concentrations represent a maximum that should not be exceeded?

So I think that's essentially the same recommendation.

The Chair: Your time has expired.

Mr. Braid.

Mr. Peter Braid: Thank you very much, Mr. Chair.

I'm pursuing a couple of previous threads of discussion.

Dr. Barker, you've mentioned, either in your presentation or perhaps in a response to a question, that you and your teams are looking at some options for remediation in terms of potential impacts of process-affected water on groundwater.

Could you elaborate on what some of those options are?

Dr. James Barker: At the moment, we're thinking there are two options. One is to encourage the biological degradation of the naphthenic acids. So that would be trying to determine under what conditions they will degrade—and there is some existing research in that area—and then trying to create those conditions in the aquifer. For example, adding oxygen to the groundwater would be one example of a remedial technology.

Mr. Peter Braid: How soon do you think we might have more precise conclusions with respect to those two areas of study?

Dr. James Barker: Probably in two years when a Ph.D. student finishes at Waterloo and a Ph.D. student finishes at the University of Alberta. We're looking at both biological and chemical remediation approaches.

Mr. Peter Braid: Generally with respect to the reclamation process, do either one of you have any recommendations on how to improve or speed up that process? Have you touched on that through any of your research? Or is that at a higher level?

Dr. James Barker: My research hasn't really dealt with that part of reclamation.

Dr. D. George Dixon: I've not been involved with what I'll call systems design and the working out of schedules associated with different end points as to when this is all supposed to happen.

Mr. Peter Braid: Dr. Dixon, there's a new water institute at the University of Waterloo. Will it have any potential involvement on this issue of the impact of the oil sands on water?

Dr. D. George Dixon: There's the potential for that. We have 100 out of the 1,000 faculty members at the University of Waterloo. So 10% of our faculty work on the area of water. We already have a number of colleagues who work in the oil sands area. I would suggest the work I do probably will come under the institute, now that it has been formed.

I'm not implying in any way that the institute is the be-all and end-all of oil sands water research activity, but we're more focused in this area than we have been in the past.

Mr. Peter Braid: Thank you again for being here.

Mr. Chair, I'm going to give my final time to Mr. Warawa.

Mr. Mark Warawa: Thank you.

There is a research paper you mentioned on page 6 of your brief that refers to the Tar Island dike, and you said the research paper has recently been accepted for publication.

Would we be able to get a copy of that?

Dr. James Barker: Certainly we can give you a copy of the galley prints. They should be available right now. I can send it to the clerk, or however you wish.

● (1055)

Mr. Mark Warawa: That would be wonderful, and it would be distributed to the committee.

Part of our review of the oil sands was looking at the new technologies regarding in situ, and 80% of the natural resource of the oil sands is going to be processed using in situ. There's a new technology called heel to toe. Are you familiar with that technology?

Dr. D. George Dixon: No.

Mr. Mark Warawa: So your focus at this point is on the 20% of the resource, which is open pit mining and the tailing ponds that go along with that.

Dr. James Barker: We have researchers in the Canadian Water Network who are involved a bit more in those areas, but neither Dr. Dixon nor I are active in the in situ. As I recommended to Ms. Duncan, I think this is an area that obviously requires additional focus. I think the federal government has resources that could usefully be put in there.

Dr. D. George Dixon: I've had some peripheral interest. On things like SAGD, when you get it out of the ground there are still some water issues, potentially some small amounts of water that need to be dealt with. I started at one point to look at a bit of the toxicity of that, but frankly I found this stuff more interesting.

Mr. Mark Warawa: For my final question back I'll go back to the Tar Island dike. We've each been given copies of DVDs, one being *Downstream*, and I forget what the name of the other one was. I think Mr. Trudeau is one of the stars in that DVD. But we've seen deformed fish—the goldeneye with the two jaws.

Dr. D. George Dixon: It's not two jaws.

Mr. Mark Warawa: My question is, is there evidence of direct seepage from the dike directly into the Athabasca?

Dr. James Barker: Yes.

Mr. Mark Warawa: At what volumes?

Dr. James Barker: The volumes aren't known. The paper I'll give you is a modelling study that gives a number. Something in the order of 67 litres per second is what the modelling study presents. But that isn't "ground truthed" at all.

Mr. Mark Warawa: Thank you so much.

The Chair: Dr. Barker, you have some homework. I was a professor who used to assign homework, but I'm going to assign some homework to you. Mr. Calkins had asked you to put together more information on the reclamation projects, and Mr. Warawa has asked for the research paper on the Suncor Tar Island dike.

Mr. Scarpaleggia.

Mr. Francis Scarpaleggia: I think Dr. Dixon mentioned he had done a workshop with Environment Canada officials, some sort of meeting with them where he had suggested some research that they could do. I'm wondering if that would be public information.

Dr. D. George Dixon: I have a PowerPoint deck that was associated with that. To be perfectly honest it's the hour and a half version of what you have here that I'll provide. I'm doing it again as a webinar for Fisheries and Oceans. Perhaps I'll send you the date for that as well.

The Chair: If both you gentlemen would send that information to the clerk, Mr. Radford, we'd appreciate that.

I have a final question for you as chair. In the testimony this morning you were talking about those end-pit lakes and about how at some point in time you have to actually just do the project and monitor it for the next 10 to 15 years. My question is, should it be done on a smaller scale than what's being proposed? You're talking about 50 hectares right now. Should it be done maybe on a smaller scale on a shorter-term basis just to see what the impact is going to be?

Dr. D. George Dixon: You could dance around the edge of this for quite a while. I'm of the opinion that considering the scale of the way things are done in the oil sands, I think it's best that they go forward with a full-scale activity and go from there. You've driven by it; it's called Base Mine Lake, and it is the lake beside the highway just as you drive into Syncrude.

The Chair: Thank you very much.

I just want to remind committee members that tomorrow at lunch, right after caucus, up in room 601 everyone is invited. We have confirmation from Ms. Cynthia Wright and from Environment Commissioner Scott Vaughan that they'll be joining us. So I hope to see you all there, and it's a chance to meet in an informal setting.

With that, I'll entertain a motion to adjourn.

Mr. Peter Braid: I so move.

The Chair: The meeting is adjourned.

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Publié en conformité de l'autorité du Président de la Chambre des communes

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