Master thesis for the
European program
on Science, Society and
Technology

Differing Views of Uncertainty in Environmental Controversies: the Kearl Oil Sands Case, 2003-2008 in Canada.

Zoë Robaey
i511005

Z.Robaey@student.unimaas.nl & zoe_robaey@yahoo.ca

October 6, 2008

Word count: 16,854

Key words: environmental controversy, uncertainty, oil sands

First Semester
Maastricht University
Maastricht, The Netherlands

Second semester
Université Louis Pasteur
Strasbourg, France
Specialization
Assessing and Communicating Risks: The Politics of Knowledge

Word of Thanks

Entering the ESST program and writing this master's thesis has been a wonderful challenge for me, coming from a natural science background.
I would like to thank all my professors and classmates for all that I learned from them and for how they opened up my horizons.
Most importantly, I want to thank my mother and my father, who always encouraged me to strive for more and who always helped me to become more my own person. I would also like to thank my uncles whose professions have also inspired me and whose input in my work was greatly appreciated.
For everything they've given me, I would like to dedicate this thesis to Maman, Papa, Alexandre et Elsa.

Abstract

Canada's oil industry is thriving thanks to the recent and continuously increasing interest for the Albertan oil sands. While for some the oil sands are a success story others consider them one of Canada's greatest social and environmental threats. Recently, a major controversy has evolved around the Kearl Oil Sands project (2003-2008) regarding what level of environmental uncertainties was acceptable or not and how to deal with them. In this thesis, the negotiation processes between the different social groups involved in this controversy will be analysed through a social constructivist perspective. Since the debate revolves around uncertainties, the groups' discourses and approaches to uncertainties will be contrasted. In the end, this study shows that there are two main positions about uncertainties. While the environmentalist groups regard them as unspecified and stable and undertake a precautionary approach to developments, the oil industry and the government consider them as specified and temporary, thus advocating more expertise and adaptive management. This analysis provides an insight on the social construction of environmental problems and how they are legally dealt with.

Table of Contents

List of Figures

Commonly used abbreviations and short forms

AENV	Alberta Environment
AM	Adaptive Management
AUC	Alberta Utilities Commission
CEAA	Canadian Environmental Assessment Act
CEMA	Cumulative Effects Management Association
DFO	Department of Fisheries and Oceans
EC	Environment Canada
EIA	Environmental Impact Assessment
EPEA	Environment Protection and Enhancement Act
ERCB	Energy Resources Conservation Board
EUB	Energy and Utilities Board
FMEA	Fort McMurray Environmental Association
GHG	Greenhouse gases
HC	Health Canada
KOS	Kearl Oil Sands
NRBS	Northern River Basin Study
OSEC	Oil Sands Environmental Coalition
PARC	Prairie Acid Rain Coalition
PP	Precautionary Principle
TOR	Terms of Reference
TWSA	Toxic Watch Society of Alberta
WPP	Western Prairie Provinces

Short Forms

Imperial Oil	Imperial Oil Resources Limited
Pembina Institute	Pembina Institute for Appropriate Development
The Agency	Canadian Environmental Assessment Agency

1. Introduction

In the province of Alberta, Canada, lie the second largest known oil reserves in the world after Saudi Arabia: the Albertan oil sands. In the last decade, with the international geo-political tensions, decreasing crude oil reserves, and rising oil prices it has become profitable to invest in the oil sands. In 1995 the report *The Oil Sands: A New Energy Vision for Canada* laid out an exploitation strategy over the next 25 years and in 1997, the Albertan provincial and the Canadian federal governments implemented tax breaks to facilitate the development of oil sands mines. This resulted in intensive industrial development in the oil sands leading to more than $52 billion injected in 81 oil sands projects since 2000.

Needless to say, such an intensive industry affects surrounding ecosystems and does not go not without environmental problems. Among other things the mining processes involve heavy landscape modifications, important water intakes, the creation of toxic tailings ponds and a significant contribution to greenhouse gases emissions. Instead of assuming that environmental problems reveal themselves through their objective conditions, I will endorse a constructivist perspective that views environmental problems as contingent outcomes of negotiation processes. A central stage for those negotiation processes in the oil sands case is the regulatory approval process of new mining projects. The Canadian government instated a strong environmental assessment process, which involves all social groups affected and interested and evaluates the level of uncertainties implied by a project before approval is granted. I will study this assessment process in the particular case of the Kearl Oil Sands (KOS) project whose environmental assessment ended up in front of a court, accused of being unlawful. The KOS project was undertaken by Imperial Oil and underwent the usual environmental assessment process between 2003

and 2007. It was then granted approval by the government after an independent panel reviewed it. The controversy arose when environmentalists groups opposed the independent panel's recommendations by requiring a judicial review of their report on the grounds that they had not provided a sufficient rationale for allowing the project to proceed although it implied significant environmental uncertainties. After the review, which took place in January 2008, the Judge ruled partly against the panel on March 5, 2008 and the panel corrected its report on May 6, 2008.

In the very recent KOS controversy I will look at the negotiations between the industry, government and environmentalist groups involved with a specific focus on how environmental uncertainties are dealt with. This will allow me to study the construction of environmental problems in a symmetrical and dynamic way (cf. Martin and Richards, 1995).

In the light of this controversy, my key questions are: How do the different parties involved deal with uncertainties? Do they use comparable approaches and are their approaches internally consistent with themselves? Moreover, why and how does the legal negotiation process participate in the social construction of an environmental risk (cf. Hannigan, 2006)? I postulate the following hypothesis: in the social construction of environmental problems around the KOS controversy, the ways uncertainties were addressed differed between the parties involved. Moreover, each group used the notion of uncertainties in an ambiguous way in order to fulfil its own interests.

Before starting my empirical analysis, I will review what has been said in the *Science and Technology Studies* literature regarding uncertainties and thereby develop the notions that will be useful in analysing the KOS case. Then, I will describe the methods I

have used to answer my questions, i.e. principally discourse analysis. This will be followed by the analysis of the KOS story in depth and in context, by introducing a brief overview of the Albertan oil sands system including the technology used, the history of the scientific environmental risk claims and the regulatory process for oil sands projects. Subsequently, I will start from the beginning of the KOS environmental assessment process until the resolution of its legal case. Linking the concepts and the case study, I aim at using a constructivist perspective on environmental controversies, bringing in a modest contribution to the field of social construction of environmental problems.

2. Theoretical Concepts and Debates related to the KOS case

This chapter will draw attention to the theoretical debates that are involved in the KOS controversy. To begin with, I will briefly introduce the notion of controversy in order to be able to characterize the KOS case as a specific type of controversy later on. Then, since the KOS case began with an environmental assessment, it is important to address the theoretical ideas underlying this process. The aim of environmental assessments is to determine whether a project is not against the public interest, i.e. whether it comprises dangerous risks or high uncertainties with severe consequences. Therefore the second part of this chapter will deal with the notions of risk and uncertainties with a focus on uncertainties since they were the point of legal debate in the KOS case. Thirdly, different actors have different views and approaches to uncertainties, which were also confronted to each other in the legal dispute. To study these different views, dimensions of uncertainties will be explained to elucidate each group's views. Finally, the Judge recognizes different ways of dealing with uncertainties like expertise, the precautionary principle/approach and adaptive management, whose salient features will be highlighted in the fourth and last part.

2.1 Environmental Controversies

Controversies are conflicts that involve opposing statements on an issue. Dietz and co-authors (1989) conducted an empirical study on the social construction of conflicts in the environmental arena and used four possible causes of conflicts for their research. What is interesting is their classification of the origins of conflict, which are: differential knowledge, vested interests, value differences and mistrust of expert

knowledge. Firstly, differential knowledge represents opposing scientific statements on an issue. It is possible to have differential knowledge as the origin of a conflict when a topic is so complex that it begs scientists to differ. Secondly, vested interests describe a conflict where the risks and benefits are not evenly distributed across groups, therefore triggering conflict. Thirdly, value differences are seen in a decision-making process where high uncertainties are involved and different groups emphasize different values be it economic or environmental. Finally, mistrust of expert knowledge can also be a cause of environmental controversies through values and interest, which are attributed from the group to which experts belong.

The commonalities between these various potential causes for environmental controversies are the complexity of the situation, the difficulty to have a clear objective assessment of risks and the high uncertainties. Values and interests become tantamount to knowledge. The following parts will describe how objective risk assessments have become more and more difficult and thereby show the emergence of uncertainties.

2.2 The Emergence of Uncertainties

Since the 1970s-80s, public and sociological awareness for the phenomena of risk, uncertainty and ignorance increased significantly. This development was the result of increasing political conflicts about technological development and environmental issues and their theoretical reflection in many fields of the social sciences. Threats of pollution, Rachel Carson's *Silent Spring*, energy crises and a global awareness of Earth's limited resources can be seen as the main preoccupation in the 60s-70s. Also, major events like the Three Mile Island accident in 1979, the Bhopal disaster in 1984 and the Chernobyl

catastrophe in 1986 contributed to expansion of environmental movements on the global scene (Jasanoff, 2001, p.310; for a brief historical overview of environmentalist movements see Jamison, 1996, p.225-226). At the same time, constructivist approaches to risk, uncertainties and ignorance emerged, often replacing functionalist approaches that had widely dominated the academic discussion of the 1940s, 50s and 60s (cf. Wehling, 2006, p.83; Hannigan, 2006, p.63, 108ff).

The new debates of the 1970s and 80s first started under the heading of 'risk' drawing on existing terminologies in economics, psychology or technology studies (Douglas & Wildavsky, 1982; Slovic, 1979 [in Tierney, 1999, p.218]; Beck, 1992; cf. Wehling, 2006, p.85). It soon became clear, however, that the classical risk term could not quite capture what seemed to be particularly interesting about the new social and political conflicts concerning technological development and environmental issues. In the field of risk assessment or decision-making theory the term risk had usually been referred to as the objective probability of an event to occur (Hannigan, 2006, p.109). Objectivizing risks only works, however, when risky events can be compared and probabilities calculated (cf. Ewald, 1991).

The new conflicts about technology and the environment have stimulated criticism of the classical objective approach. Particularly, two points have been addressed: first the shortcomings of its notion of objectivity and second the nature of the 'new risks'. While the discussion of the first point remained under the headline of risk, the discussion of the second point shifted away from risk and brought in notions of uncertainties and ignorance.

From an anthropological standpoint, Douglas and Wildasvsky (1982) argued that risks are not only objective statistics but are also strongly embedded in culture. The authors endorse a relativist perspective through which scientific evidence or the likelihood of danger has little to do with actual risks. Rather, risks can be considered as 'collective constructs' subject to cultural and group values (Douglas and Wildasvsky, 1982) negotiated through competing claims about risks. Although Douglas and Wildasvsky have been criticized for their cultural relativism (Hannigan, 2006, p.110f), their book played an important role in challenging the objectivity of the notion of risk.

Also, research in psychology and social psychology about the perception of risk revealed that most people have problems understanding risk information and looked for explanations with regards to discrepancies between calculated and perceived risks (Slovic et al. 1979; McDaniels et al. 1995; Slovic 1992; Tverski and Kahneman., 1973 [in Tierney, 1999]). Moreover, it became clear that perceived risks could undergo amplification through several social processes also questioning its independence from social factors (Kasperson, 1992).

For other authors, there exists reconciliation between a so-called objective approach, also referred to as technical risk assessment (Renn, 1992) and more relative approaches that take culture and perception into account. For instance, in his classification of risk, Renn acknowledges that risks are not only objectively defined. For him, technical risk assessments are necessary but narrow. However, this narrowness can be completed with risk analyses from the social sciences (Renn, 1992, p. 60f). The concept of risk can therefore be considered as having multiple dimensions and its definition cannot therefore be as straightforward as an objective measure.

In the academic discussions about the new technological and environmental problems, it soon became clear that the term 'risk' did not capture the issue. Beck's *Risk Society*, first published in German in 1986 opened the debate about the new risks. The increasing complexity of systems brought about by modernity creates a risk society where risks are unintentional, unseen and compulsive and are the result of technological latent side effects.

From then on, the considerations about the nature of risks took off. It became apparent to many scholars that using the term risk led to the tendency of overlooking essential differences concerning the knowledge about possible side effects and the ability to control them (Wynne, 1992). Many authors have argued that the nature of the new problems was different (cf. Weinberg, 1985; cf. Collingridge, 1980; cf. Wehling, 2006, cf. Beck, 1992; cf. Krohn and Krücken, 1993). For example, the perils of nuclear technologies and gene engineering did not fit the classical criteria for objective risk assessment. In cases like these it is hardly possible to assess probabilities and the amount of damage. Moreover, the scope of the side effects is barely knowable. The new risks are no longer comparable (cf. Weinberg, 1985) calculable and predictable. Also, in the classical sense, the risks would be on those who *take* them, whereas in the new sense, a large part of risks are on those who did not participate but are subject to the consequences (cf. Krohn and Krücken, 1993). Today, new risks often threaten a larger number of people in an unpredictable way (Beck, 1992; Perrow, 1984).

As it became clear that the terms *risk* or even *new risk* did not quite capture what seemed to be the interesting aspect, in the literature, there is a shift from what we know and control to what we do not know and therefore do not control. This insight has shifted

the discussion away from the notion of risk to the notions of uncertainties and ignorance. These notions existed before and did not emerge as a result of the limits of the risk concept. Smithson writes: "Traditionally, ignorance is treated as either the absence or the distortion of "true" knowledge, and uncertainty as some form of incompleteness in information or knowledge" (1993, p. 136). However, to this day, these notions are still debated and there are still confusions and controversies on terminologies with differentiations between uncertainty and ignorance, which basically represent a full or partial lack of knowledge (Collingridge, 1980; Kahneman and Tversky, 1982 [In Wehling, 2006, p.110]; Ravetz, 1986; Wynne, 1992; Wehling, 2006). What is also interesting in the debates about non-knowledge and its fine differentiations is that sociologists worked on it especially through the notion of ignorance. Wehling (2006) for instance, criticizes the continuum between risk, uncertainties and ignorance and focuses his work on ignorance. He supports that ignorance has a completely different quality than risk or uncertainties and he suggests studying it through different dimensions. On the other hand, authors like Stirling (2007) provide a typology of risk, uncertainties, ambiguity and ignorance classifying them according the notions of known probabilities and known outcomes. Aside from classifying or putting in dimensions uncertainties and ignorance, Smithson (1989) argues that the rules that applied to the social construction of knowledge also apply to the social construction of ignorance. Further, Stocking and Holstein (1993) describe ignorance construction as a claims making activity. According to the authors, perspectives on ignorance vary depending on the situatedness of the claims-makers and their interests. As there is competition between claims, different groups will use rhetorical strategies to put their perspective forward.

All in all, the terms uncertainty and ignorance are used to describe the realm of what we do not know. Although scholars tend to focus on the term ignorance, politicians, entrepreneurs and the public seem to refer to it mostly as uncertainties. Therefore, although most of the cited work has been done on ignorance, I will refer to it as uncertainties, embedding scholarly notions of uncertainties and ignorance.

2.3 Dimensions of Uncertainty

A useful way to look at uncertainties and how different actors talk about them is to look at a series of criteria occurring in each actor's discourse about uncertainties. To do so, Wehling's existing dimension of ignorance (Wehling, 2006, p.116ff) can be applied, in the context of this work, to uncertainties. Although he developed them to study *ignorance* in a three-dimensional fashion looking at knowledge, intentions and temporal stability, I will use these to look at the different discourses about *uncertainties*. Figure 2.1 below offers a representation of the dimensions and their different degrees. It is important to note, that all three dimensions represent continuums. They therefore create a three dimensional space of possible intermediate forms.

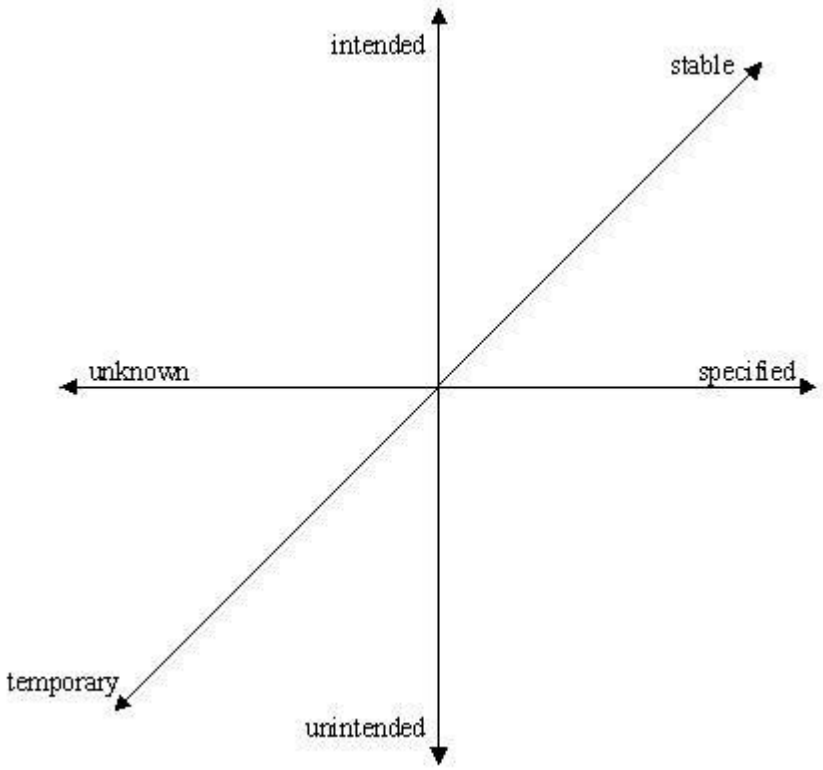

Figure 2.1: Wehling's dimensions of ignorance

On the x-axis, we have the dimension of *knowledge*, within which different degrees go from unknown to specified. Wehling talks about *known* ignorance in the sense that, like knowledge, ignorance is not permanently present but it can become explicit in a relevant context where a problem needing that particular information occurs. For my analytical model, *unknown* uncertainties are the ones we do not know that we do not know and *specified* uncertainties are the ones we are aware we do not know, both in a specific context.

The y-axis represents the dimension of *intentionality*, which ranges from *unintended* to *intended* uncertainties. Wehling describes unintended ignorance as the inevitable by-product of the production of knowledge. Intended ignorance has an intention and interest-

laden quality. It can either mean that the actors do not want to know something or they want to hinder others from knowing something. In my analytical framework, there are in the same way unintended uncertainties, which result from the complexity of the system, and intended uncertainties, which are intentionally presented as uncertainty for the actor's interests.

The z-axis represents the dimension of *temporal stability* of uncertainties, which ranges from *temporary* to *stable*. What Wehling means by that in the context of ignorance is that a temporary ignorance is an ignorance that one will eventually transform into knowledge and a stable ignorance is one that will never be found out. However, Wehling (2006, p.133) points out here that these distinctions are always apt to social interpretation or conditions, i.e. through the interests in an issue and the state of scientific knowledge at the time. Ignorance is usually considered temporary, but for certain issues like climate change or genetically modified organisms, the temporary notion is difficult to apply regarding the extent of what temporary can mean. In the present case, these dimensions will also apply to uncertainty.

2.4 Ways to deal with Uncertainties and their Limits

As previously mentioned, dealing with risk had a predictable and comparable dimension and it has always been a challenge. However, with the overwhelming uncertainties of the current high-technology society, dealing with uncertainties has become an even bigger challenge. Different authors point out different ways of dealing with uncertainties in eco-socio-technological systems. Collingridge (1980) first opened the debate in 1980 with the so-called control dilemma in which he points out that

deliberate shaping of technologies can only take place at early stages of technological development but the consequences are only known at a later stage. Since then different proposals have been made as to how one could deal with uncertainties. Three of them that are widely discussed are presented here: scientific expertise, the precautionary principle and adaptive management.

2.4.1 Expertise

Although social constructivism of knowledge has debunked scientists' ivory tower, they still remain in society the most legitimate source for answers. Wehling (2006, p.279ff) presents the work of van der Daele and his expertise-model. It supports the following idea: if experts discuss sufficiently within their own community, without lay knowledge, they will be able to specify ignorance. In dealing with uncertainties, the notion that they are temporal as discussed earlier joins this expertise-model since it considers that answers will be provided in time even if at the moment it is unknown. Wehling criticises this model for only looking at the known or suggested ignorance of experts: (1) it does not deal with the problem of unknown ignorance – this also applies to uncertainties (as the actors do not use the word ignorance) and the expectation is that experts find solutions to specific problems, which do not have any yet; (2) it does not take into account problems that were not defined at the beginning of the project; (3) it considers experts as the ultimate source of legitimacy – the relevance of ignorance or uncertainties cannot only be assessed by empirical claims; it is genuinely connected to values.

An aperture that has been made in recent times is to consider other forms of knowledge as scientific knowledge. Lay-knowledge helps understanding the bigger picture and the stakes that are involved. It also challenges the idea of objective and absolute scientific knowledge and lets the idea of values come in as different social groups are taken into account. In this work, expertise is a concept used by all groups, which will be demonstrated in chapter 4.

2.4.2 The Precautionary Principle

Another way of dealing with uncertainties is the precautionary principle (PP), which gives place to values. However, despite its broad use in the political sphere, there remains an extreme variability in interpretation (Foster et al., 2000). In its most extreme form the precautionary principle prohibits any implementation of new technologies unless there is an absolute proof of safety, and has therefore been criticized for its paralyzing effects (Foster et al., 2000; Sunstein, 2003). A less radical reading of the principle only demands that a lack of full scientific certainty should not be used as a reason for postponing measures to counteract possible harmful effects (cf. Rio Declaration on Environment and Development, 1992 [In: Foster, 2000]).

Although the definitions are multiple, each of them still leaves room for interpretation. In the European context, with similar definitions and guidelines (cf. Foster, 2001; cf. European Community Communication on PP, 2000), Renn describes the PP as still possessing "serious ambiguities and queries" (2007, p.303).

To begin with, the PP is not a novel idea. Kriebel and co-authors (2001) describe its presence under different appellations in different countries, originating in Germany as

the *Vorsorgeprinzip* related to environmental policy. With growing concerns regarding climate change and other global environmental issues, the term PP has become predominant (Adams, 2002). Moreover, Adams describes a transition between the precautionary approach and the precautionary principle depending on environmental and national contexts. Many authors argue that the precautionary principle is ill defined and perhaps even not definable (Renn, 2007; Adams, 2002; O'Riordan, 2001).

Scholars point out the contradiction of the term in itself (Adams, 2002; Balzano and Shepard, 2002) as a principle, thus a general truth, and a precaution, which implies a judgement that cannot be defined by a universally accepted law. Also, PP presents contradictions with other fundamental rules of logic and authors accuse the PP of being "normatively empty" (Peterson, 2007, p.307). The place of science in the use of the PP has also been studied (Resnik, 2003; Foster et al., 2000). Since the PP is not a rule, and relies importantly on value-judgement, authors have suggested sound ways of using it since it is becoming widely used as a tool in environmental policy-making to deal with uncertainties (Resnik, 2003; Stirling, 2007; Sandin et al, 2002).

Nonetheless, van Asselt and Vos (2006) point out another underlying paradox to the precautionary principle in its application, which is "on the one hand, it is increasingly recognized that science cannot provide decisive evidence on uncertain risks, while on the other hand policy-makers and authorities increasingly resort to science for more certainty and conclusive evidence (compare Weingart, 1999)" (2006, p.317).

The increasing debates on the PP in Europe have spilled over to North America; it has been integrated to the Canadian legislation with the same definition as found in the Rio Convention. Environment Canada has also published a pamphlet on its website

regarding the precautionary principle. In this document dated from 2002, it stated that the precautionary approach "creates a positive legal duty to act" but that it is also a "decision to act or not to act" (Environment Canada Guidelines on the PP). In this document, the terms precautionary approach and precautionary principle are used interchangeably, although a note remarks that they can be understood differently without further comments. In the following chapters, the actors also seem to use these terms without stating their difference. While the precautionary principle has a lot to do with value judgement, this Canadian document stresses the need of sound scientific information and of scientific "follow-up" programs on precautionary decisions.

2.4.3 Adaptive Management

The use of follow-up programs in a precautionary approach reminds of adaptive management, which is another tool that some groups seem to favor in dealing with uncertainties. Adaptive management is a concept developed by Canadian ecologists C.S. Holling and C. J. Walters (Holling, 1978; Walters 1986; Holling and Walters, 1990) and it has been strongly embedded in North American customs of fishery management.

Adaptive management consists in handling the uncertainties step-by-step, as the problems show up. This corresponds to Collingridge's initial idea of a control dilemma where the quandary lies in the decision under uncertainty and the path-dependency of a project. He supported that to avoid irreversible consequences one has to detect the negative effects as soon as possible and be able to adjust initial decisions. That is also the idea behind adaptive management: decisions under uncertainties are not fixed. They are subject to change as soon as negative signs appear. This converges also towards the idea

of real-world experiments developed by Krohn and colleagues (Gross et al, 2005), where the process of learning is central to dealing with uncertainties. It is also said to be useful in overcoming the paralyzing effects of the precautionary principle.

Although the idea is so simple and enticing, it still presents some problems. Adaptive management (AM) has been criticized for overestimating the ability of the proponent to regulate and underestimating the temporal stability of the uncertainties (cf. Wehling, 2006). Beck (1996) describes these side effects as latent and unseen. Can they be monitored at all? And can they be specified in time? McLain and Lee (1996) also point out other pitfalls of AM which all result through the use of standardized models shared by scientists, regulators and policy-makers. This lack of diversity may lead to dismissing hypothesis that could be valid if studied under a different angle.

In conclusion to this chapter, two ideas are central to environmental controversies: science and values. Science seems to be both a limiting factor as well as a catalyst for decision making under uncertainty. Science is present in expertise, in the PP and in adaptive management. Values are also present, but mostly through the precautionary principle. Expertise values science. Adaptive management values science and precaution since it leaves place for flexibility regarding the decisions. Although values and interests have become tantamount to knowledge, the latter still seems to remain the moving force in decision-making. The following case will investigate how an environmental controversy was legally settled by studying the involved groups' views on uncertainties.

3. Methods

To verify the hypothesis that different groups have different visions about environmental uncertainties according to their goals, I will study the KOS case that started as an environmental assessment in 2003 and turned into a legal dispute in 2007, which was finally settled in 2008. The specific groups involved were identified from the KOS judicial review documents and the documents available from the Canadian Environmental Assessment Registry. The case opposes the claims and views of environmentalist groups to those of the oil industry, the review panel for environmental assessment and the government.

To answer my question regarding the different parties' ways to deal with uncertainties, I will do a discourse analysis of several documents relevant to the case. The discourse analysis will look into the key themes of uncertainties, scientific expertise, the precautionary principle and adaptive management. The views of uncertainties and its approaches will be also analyzed following the dimensions described by Wehling (2006) in chapter 2 of this work. Looking at how the different groups use those concepts in their argumentation and what they say or do not say about them will provide an insight into the interests and goals of each group in this environmental controversy (cf. Tonkiss, 2004, p.378). Each group is also a claim-maker. Therefore, I will also look for their rhetorical strategies (cf. Stocking and Holstein, 1993, p.189ff). The interactions between the groups are also central to understand dynamics and influences, I will study them looking at the contexts in which those interactions occurred and their nature.

There are two phases to this case, one before the legal pursuit, and one during, which closes the debate. They are important to analyze in order to understand the

evolution of discourses from the different groups and also understand the escalation towards the legal dispute. The documents comprise letters, reports, and statements. Appendix A contains a detailed chronology and list of documents from the environmental assessment process. Also, the legal documents pertaining to the trial were analyzed, namely Simon Dyer's affidavit (January 11, 2008), Justice Lamer-Tremblay's ruling (March 5, 2008) and the Panel's response to the decision (May 6, 2008).

Since this is a very recent case, semi-structured interviews (cf. Leech, 2002) were carried. I however encountered a lot of reluctance from several representatives since this is still a very sensitive issue in Canada. The interviews and personal correspondences with representatives will therefore not be used for analytical purposes but rather for complementary information. Nonetheless, the interviews were carried with a two-fold intention: first to gather information and explain already available information and second to bring out positions regarding the key themes. For a detailed list of interviews and contacts see Appendix B.

4. Case Study: The Kearl Oil Sands Controversy

The Albertan oil sands involve a multi-faceted and complex system including technological, scientific and legal aspects. Before looking in the KOS story, it is necessary to provide some more general information about the oil sands to understand how this particular story is situated in the meshwork of oil mining and environmental regulation in Canada.

4.1 The Albertan Oil Sands

4.1.1 The Technology

Oil from oil sands, contrarily to crude oil, cannot simply be pumped from the ground. Oil sands are also called tar sands and contain a heavier form of oil called bitumen. The commonly used technique in the current oil sands exploitation projects is open-pit mining. Figure 4.1 describes how the process is carried out. The oil sands are located closely under the surface of the earth. After the forest is cut, "the world's largest trucks" dig out the overburden to uncover the oil sands, which will be also dug out to undergo a simple process of extraction, which requires important amounts of water and a number of toxic chemicals. Just to have an idea of how this technology works, the Alberta Energy website states, "about two tons of oil sands must be dug up, moved and processed to produce one barrel of oil. Roughly 75 per cent of the bitumen can be recovered from sand; processed sand has to be returned to the pit and the site reclaimed." Tailing ponds result from digging and are filled with toxic water and sand remaining from the separation process.

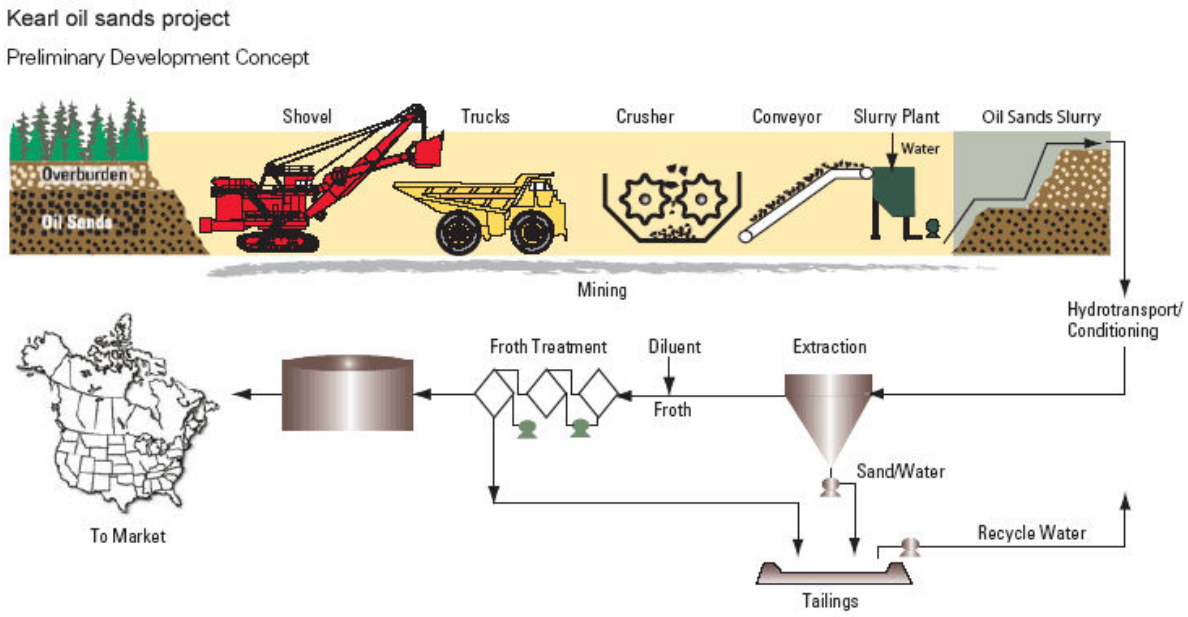

Figure 4.1 Oil sands extraction processes (Imperial Oil's Kearl website)

Other technologies exist, like *in-situ* recovery. *In-situ* recovery entails technologies like cyclic steam stimulation or steam assisted gravity drainage. However, open-pit mining is the oldest and most commonly used technology for the biggest oil sands projects. Although this technology seems the most straightforward, it was not always the preferred one. Marsden (2007) traces a history of the Albertan oil sands' exploration and exploitation. Sydney Ells, a federal mining engineer and surveyor, was the first to experiment with processes relying on heat to extract bitumen from the oil sands. This then served as a basis for both open-pit mining and in-situ technologies. At the same time, in 1917, he assessed the extent of the reserves in the Albertan oil sands. Although this is the technology used today, Marsden states that American investors and the Canadian government had nonetheless entertained and supported the idea to use the atomic bomb in oil sands fields in order to extract the oil from the tar in the 1950s. Nonetheless, non-proliferation treaties, supported by Canada, lead to those projects to

being dropped. Later on, Soviets were discovered to have undertaken similar experiments in the Ural and they had resulted in contaminated waters.

The exploitation of oil sands had been taking place at an exploratory phase since the mid 1960s. Consistent exploitation only started at the beginning of the 1990s, when oil barrel prices reached a high and open-pit mining became a viable technology. Until that point, no other technology had proven efficient enough. Currently, there are about 80 oil sands projects taking place or being prepared in the province of Alberta using either open-pit mining or *in-situ* technologies. There are three main oil sands fields: Athabasca, Cold Lake and Peace River. The Athabasca oil sands fields, located around the city of Fort McMurray, are the most abundant in resources and also are the ones hosting the largest oil sands open-pit mines[1] although other kind of extracting technologies are also used there. Seeing the extent of the Albertan oil sands industry (see Figure 4.2), I will now trace a brief history of the environmental risk claims.

[1] The main proposed projects in the Athabasca oil sands are:
- Fort Hills (ran by Petro-Canada/UTS Energy Corp. / Teck Cominco),
- Northern lights (ran by SynEnCo Energy Inc. / SinoCanada Petroleum Corp.) and
- Kearl (ran by Imperial Oil Resources / ExxonMobil Canada)

One major project is currently under construction:
- Jackpine (ran by Albian Sands Energy Ltd. (Royal Dutch Shell / Chevron Canada / Marathon Oil Corp.))

And 3 major projects are currently producing:
- Muskeg River (ran by Albian Sands Energy Ltd. (Royal Dutch Shell / Chevron Canada / Marathon Oil Corp.))
- Suncor Steepbank/Millenium (ran by Suncor)
- Syncrude's original mine, Aurora North and Aurora South (ran by Syncrude)

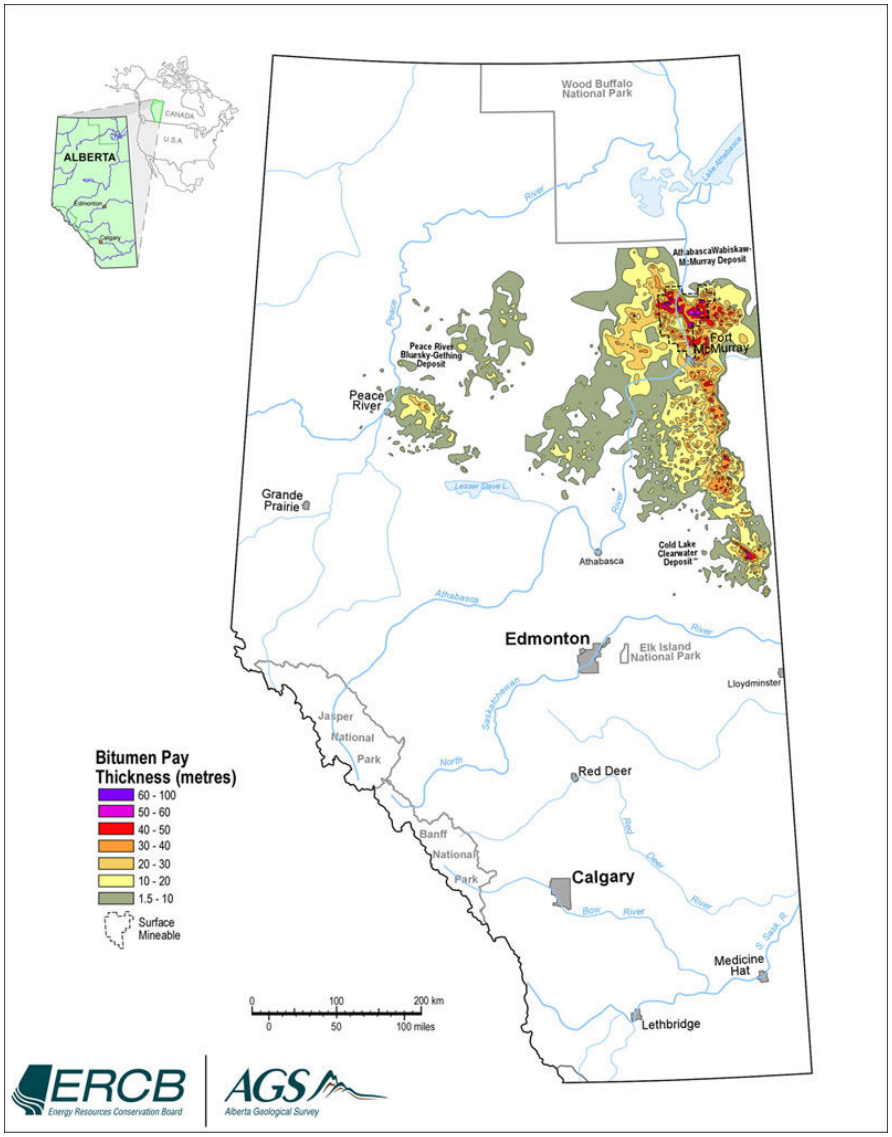

Figure 4.2 Map of oil sands fields in Alberta, Canada (Alberta Geological Survey)

4.1.2 The Emergence of the Environmental Risk Claims

A first phase took place between the 1990 and 1996, where the emergence of environmental degradation started to raise concerns. Secondly, from 1997-2005, the risk claims seemed to be solidified by more conclusive and independent studies as well as the creation of a Cumulative Effects Management Association (CEMA) especially for Albertan Oil sands (Spaling et al., 2000). The third phase started in 2006, where scientist

finally succeeded in voicing their concerns in a less marginal fashion within the scientific community.

The first phase

In the 1990s, the biological community voiced its concerns regarding the potential degradation of particular Canadian ecosystems like the boreal forest[2] and the northern rivers basin. A study called AQUAMIN was conducted in 1996, investigating the impact of mining on the environment and significant impacts on water quality, sediment quality and on fish and benthic invertebrate communities[3] were established (Simon Fraser University think-tank, 2002, p.307). In 1996 as well, another publicly funded project, the Northern River Basins Study (NRBS) closed five-year research efforts with a series of recommendations for provincial and federal governments. In a teamwork uniting expert and lay-experts[4], like First Nation people, an environmental assessment of the area was conducted. In their lengthy report, they expressed concerns over the oil sands near Fort McMurray and the land disturbance that their exploitation caused. Furthermore, worries about the efficiency and safety of tailing ponds were also voiced regarding potential leaks and contamination. (NRBS website).

The second phase

In 1998, the Northern River Basin Initiative set out to make a follow up on the NRBS recommendations under the form of policies and further research. The follow up

[2] The boreal forest is an old-growth forest, which means it took a very long time for it to exist without significant anthropogenic disturbances.
[3] Benthic communities are the ones that live at the bottom of an aquatic system. They are usually good indicators of ecosystem health since they do not have a very high trophic level, which means that many other animals feed on them.
[4] Aboriginal leaders, government officials, municipal representatives, members of the environmental, health, agricultural, industrial and public sectors designed projects. Private companies, individuals, government agencies and educational institutions conducted the scientific work.

on previous governmental projects shows the growing concerns in answer to the concerns raised a few years beforehand.

More publications came out with a more specific focus on the problems created by oil sands exploitation. Bendell-Young and colleagues (2000), ecologists at Simon Fraser University, published a study looking at how oil companies were reclaiming sites and creating tailing ponds, which by gradual[5] seeping transformed the surrounding areas into wetlands[6]. Both the industry and the government financed this study. Selecting a series of ecological parameters to measure and comparing them to those of already existing wetlands, they tried to determine whether those newly created wetlands were stable on their own. The result of their study suggested that at least fish would not be able to live in such environments and that it could also have consequences for migratory birds. The intention of oil companies to use these wetlands as reclaimed areas would then not be as successful as they would need to be.

Also, Environment Canada required an assessment for the cumulative effects resulting from oil sands developments in Alberta. In this report, they set out a list of objectives and priorities in the cumulative effects assessments. They also instated the role of the Cumulative Effect Management Association (CEMA), a non-profit and non-governmental organisation, in managing the 17 oil sands exploitation projects up to date. CEMA does not only assemble scientific knowledge for monitoring and setting environmental thresholds but it reproduces what the NRBS did by including different communities and particularly the industries exploiting the oil sands: “Economic reality is

[5] This is another characteristic of ecological studies; they usually occur a while after a disturbance has occurred since ecosystem processes are often not spontaneously noticeable.
[6] Lands mostly saturated with water and welcoming particular species to that habitat

as embedded in CEMA as are its principles of multi-stakeholder partnership and consensus decision making." (Spaling et al., 2000)

The third phase

An important step in the assembly of the environmental problem claim in the scientific community was the publication of the inaugural article (May issue 2006) in the Proceedings of the National Academy of Science of the United States of America (PNAS) by Dr. David Schindler, a renowned ecologist in the field of aquatic ecosystems, and WF Donahue. In this paper, Schindler and Donahue were able to link empirically the threat of oil sands exploitation not only to local ecological threats, as it had been the focus of regional studies, but also to regional environmental problems. Their focus was on the water availability and quality throughout the Western Prairie Provinces (WPP) in Canada. They suggested that, "if the trends described above continue, the combination of climate warming, increases in human populations and industry, and historic drought is likely to cause an unprecedented water crisis in the WPP. The resulting decrease in water quantity will contribute to declining water quality, as described below. This decline will exacerbate the water crisis in the WPP." (Schindler and Donahue, 2006). They also particularly underline the ecological and societal disaster that will be brought about by the current regime of oil sands exploitation[7].

[7] They write, "Currently, the oil sands consume three to six barrels of water per barrel of oil produced. Unless future water use is curtailed, oil-sands development will require {approx}45 $m^3 \cdot s^{-1}$ of water supply by 2020, based on recent estimates. This is the equivalent of nearly half of the Athabasca River's low winter flow during eight of the years since 1980 and in every year since 1999. The Athabasca and Peace rivers are critical for ecological sustenance of the Peace-Athabasca Delta World Heritage Site at the rivers' confluence, which is home to several thousand aboriginal people. The vast Delta wetlands are already exhibiting negative effects of declining water supply from climate change and the Bennett Dam on the Peace, but large industrial oil-sands projects in the Athabasca drainage and reservoirs on the Peace River continue to be proposed and approved." (Schindler and Donahue, 2006.)

Overall, the claimed environmental risks associated with the exploitation of oil sands in Alberta are the drought of the Athabasca River, the contamination of the rivers and soil, the disturbance of landscapes with the intensive deforestation and the leaking of tailing ponds creating instable wetlands ecosystems, and finally the ecological instability of reclaimed site.

It has been acknowledged that the uses of this technology as well as its environmental impacts need to be managed and controlled. The following section will thus draw out how this process is done in Canada, and particularly for the oil sands.

4.1.3 Canada's Environmental Legal Landscape

4.1.3.1 The Regulatory Process

There are two levels of regulation in Canada: federal and provincial. When an oil sands project entails landscape modifications and overlaps federal and provincial authority, both authorities carry out an environmental assessment. In order to make the process more effective, the federal government has signed agreements with each of the provinces and territories to carry out a joint environmental assessment. The *Canada-Alberta Agreement on Environmental assessment cooperation* was enacted in 1999 and lastly updated in 2005. It stipulates that environmental assessment should be conducted respecting two acts, the Alberta's *Environmental Protection and Enhancement Act* (EPEA) and Canada's *Canadian Environmental Assessment Act* (CEAA). Although not all landscape-modifying activities require an environmental assessment, oil sands do require one and the proponent of the project is charged to carry it on by producing an Environmental Impact Assessment (EIA). There is an extensive list of information

stipulated by the *Canadian Environmental Assessment Agency* (the Agency) in the *Terms of Reference* (TOR) that the proponent has to include in the EIA. There are three types of reviews in environmental assessment: a screening (CEAA, ss. 18-20), a comprehensive study (CEAA, ss. 21-24), and mediation and panel reviews (CEAA, ss. 29-36). In the case of larger projects entailing significant uncertainties, the federal government selects the latter one, a *Panel* of independent experts whose main task is to review the EIA and hold public hearings. During those hearings, everyone related to or affected by the project is welcome to voice its opinion and rationale on different points of concerns. After compiling all those opinions, the Joint Panel formulates recommendations, which are then sent to the provincial regulatory authorities. The different cabinets will then have the decisional power to approve or not the projects. In the case of oil sands in Alberta, the former Energy Utility Board (EUB), which split into the Energy Resources Conservation Board (ERCB) and the Alberta Utilities Commission (AUC) as of January 1, 2008, was usually the one handing out the permits. However, since the oilfields are located along the Athabasca River and the oil industry heavily uses its waters, the Department of Fisheries and Oceans (DFO) becomes often the main authority for delivering permits.

The environmental assessment regulatory process therefore depends on the type of activity and the region where it is carried. There is no one standard environmental assessments process. The one described above is the one that usually takes place for large oil sands mines in the Athabasca oil sands fields.

4.1.3.2 The Legal Background: the EPEA and CEAA

The EPEA and the CEAA are the two most important acts governing the environmental assessment of oil sands in Alberta. Both acts were first established in 1992 with various amendments over the years. They also describe the regulation of environmental assessment, the different organs and how they interact with each other.

The EPEA in Alberta is subdivided in 11 parts, which detail the above-described procedures of environmental assessment. The highlights of this act are the description of the purposes of environmental assessment in section 40 which are

"(a) to support the goals of environmental protection and sustainable development, (b) to integrate environmental protection and economic decisions at the earliest stages of planning an activity, (c) to predict the environmental, social, economic and cultural consequences of a proposed activity and to assess plans to mitigate any adverse impacts resulting from the proposed activity, and (d) to provide for the involvement of the public, proponents, the Government and Government agencies in the review of proposed activities." (EPEA, s. 40)

The roles of environmental protection and sustainable development are also defined in section 2: "(a) the protection of the environment is essential to the integrity of ecosystems and human health and to the well-being of society" and "(c) the principle of sustainable development, which ensures that the use of resources and the environment today does not impair prospects for their use by future generations". (EPEA s.2)

At the federal level, the CEAA has the same fundamental principles as the EPEA in Alberta, i.e. "to achieve sustainable development by conserving and enhancing environmental quality and by encouraging and promoting economic development that

conserves and enhances environmental quality." (CEAA, Preamble). The main difference between the EPEA and the CEAA is that the provincial law goes into detail about what is acceptable regarding the level of the release of substances, contaminated sites, conservation and reclamation, potable water, hazardous substances and pesticides, and finally waste and recycling. Whereas the federal law limits itself to describing how environmental assessment should be done and which activities must submit to it. This shows a lot of autonomy at the provincial level in determining up to what point the environment should be preserved or conserved.

Within this context, I will analyse a specific case where actors evaluated the use of open-pit mining, elaborated solutions to environmental concerns and enacted laws and regulations using them to meet their objectives. I will show how this story has shaped the understanding and management of the complex Albertan oil-sands system.

4.2 The Kearl Oil Sands Project, how a controversy arose

In 2003 Imperial Oil, one of Canada's largest petroleum companies took over an old exploitation project, the Kearl Oil Sands (KOS) project that ExxonMobil had initiated in 1997 but not carried out. Like other mining projects, it filed for regulatory approval in 2005 and provided an Environmental Impact Assessment (EIA) to the Canadian Environmental Assessment Agency (the Agency). Due to the scope of the project, a Joint Panel was to assess and review the EIA and hold public hearings, which took place in November 2006. Finally, in February 2007 the Panel issued the recommendation for the regulatory authority, the Department of Fisheries and Oceans (DFO), to approve the KOS

project. The environmental impacts were judged to be insignificant provided Imperial Oil implemented its mitigation measures (in Pembina Institute for Appropriate Development v. Canada (Attorney General) (2008 FC 302) T-535-07, [March 5, 2008]).

Immediately after the DFO's approval based on the Joint Panel's report, the Pembina Institute for Appropriate Development, Prairie Acid Rain Coalition, Sierra Club of Canada and Toxics Watch Society of Alberta (the Coalition) filed a complain claiming that the environmental assessment of the Kearl Project had been done unlawfully. The accusations concerned the illegitimate approval of the Cumulative Effects Management Association (CEMA), endangered species and greenhouse gas emissions in Imperial Oil's EIA. Justice Lamer-Tremblay settled the case on March 5, 2008. The Canadian Environmental Assessment Act (CEAA) was the main legal document on which the ruling was based. According to the Judge, the central tenets of this act are the precautionary principle and adaptive management. She weighed each party's arguments against these tenets and the two fundamental steps of the CEAA i.e.: environmental assessment and decision and follow-up. She concluded that only the lack of rationale for mitigating significant carbon dioxide emissions in the Panel report was unlawful and asked them to review only this part of the report.

This marked a partial victory for the Coalition, which took an unexpected turn of event. The DFO pulled out Imperial's permit following the ruling thereby halting the KOS project's developments. Imperial then sued them for taking away the license and claiming important damages as the result of delays. However, Mr. Justice de Montigny ruled against them on March 27, 2008, on the grounds that their claims for delays and damages were not precise enough to be justified. (Imperial Oil Resources Venture

Limited v. Minister of Fisheries and Oceans (2008 FC 382) T-460-08. March 27, 2008.) Imperial appealed this decision but was turned down again on May 14, 2008 by Mr. Justice Campbell (Imperial Oil Resources Venture Limited v. Minister of Fisheries and Oceans (2008 FC 598) T-460-08. Date May 14, 2008).

In the end, on May 6, 2008, the Joint Panel produced an addendum to its report as required to by the Judge. This addendum stated that the governments of Alberta and Canada would be the ones regulating carbon dioxide. No further actions were pursued from the Coalition and Imperial Oil was allowed to resume the Kearl Project on June 5, 2008.

The KOS judicial review is a first in the history of the Albertan oil sands exploitation. Although it only momentarily halted the KOS developments, it brought national attention to the environmental impacts created by the oil sands industry and shook up the power relations between government, industry and environmentalist groups. The events and dynamics uncovered through the KOS trial allow studying how different groups talk about environmental risks and uncertainties.

4.3 The Actors

4.3.1 The Operator: Imperial Oil

Imperial Oil is Canada's largest oil company. It was created as the result of a merger between several Southern-Ontarian refiners in 1880 (Imperial Oil website). Imperial Oil began installing refineries in Alberta in 1923 and slowly established itself as the province's biggest refiner with enlarged facilities (Klassen, 1999, p. 144). The big break that launched the company to the top was the discovery of Leduc oil field in

Alberta in 1947. This not only settled Imperial Oil's stronghold in this province but also placed it as Canada's biggest oil company (Klassen, 1999, pp.125-126). Imperial Oil also became a local symbol for mass production and innovation in businesses in Alberta. It consolidated its empire by contributing to the creation of long-distance pipeline (Klassen, 1999, pp.144-146) establishing itself at all levels of the oil industry's technological system: production, refinery and transport. In 1985, Imperial Oil started exploiting oil sands and using its refineries to produce crude oil from it. It did so by creating subsidiaries and investing with other oil companies. For instance, it owns the oil sands project in Cold Lake and also owns 25% of the Syncrude mine in Fort McMurray (Klassen, 1999, p147). Imperial is also part of the larger international petroleum industry since 69.6% of its stocks belong to the American ExxonMobil.

In most documents that were analyzed, Imperial Oil is referred to either as "the proponent" or "the operator". In the Canadian system, the proponent has to justify that its project is in the public interest. Recently, environmental issues around the exploitation of oil sands have taken a high priority on questions regarding the public interest primarily for human health and First Nation livelihood reasons. For large projects like the KOS project, Imperial not only invests in the industrial development itself but also in these other important issues. An *Environmental and Regulatory* manager, a *Stakeholder Relations* advisor and an *Aboriginal Affairs* advisor are responsible only for the KOS project itself. Moreover, on its website, Imperial prides itself for environmental responsibility highlighting sound use of technologies since 1918. As Canada's largest oil company, Imperial Oil has a lot of responsibilities towards citizens and the environment.

4.3.2 The Regulator: different governmental bodies involved

There are several governmental bodies involved in any natural resource exploiting projects. Although many of them have regulatory power, it does not mean they have decisional power. In the KOS case, the DFO was the only one to have decisional power since the project entailed significant water use from the Athabasca River.

The DFO is nonetheless not alone in its decision-making role. Different cabinets have a counselling responsibility and the DFO only takes a decision after the Joint Review Panel appointed by the Agency emits a recommendation. This recommendation is the result of a public participatory process involving lay-people, specialist consultants and other governmental bodies. In the end, when the Review Panel recommends specific management plans, it refers to the regulator to help Imperial Oil keep up the conditions to its approval. In the KOS case, the regulator is Alberta Environment (AENV) and Environment Canada (EC).

The DFO, AENV and EC all have for mission Canada's sustainability. They all mostly provide monitoring, surveys and expert reports. Therefore, their regulatory role lies in the monitoring and application of environmental management guidelines elaborated throughout the process of the KOS project environmental assessment.

Independent actors nominated by the government

The Joint Panel and the federal judges are independent actors that are appointed by the government. In the KOS case, three independent members were appointed to the Joint Panel, one from the federal government and two from the provincial government. Only biographical elements of the federally appointed member were available. Information gathered from interviews and other available documents suggested that the

two other members were members of the former EUB of Alberta although their biography was never officially published. Although the Joint Panel is an independent body, its views were put before a court next to Imperial Oil in the KOS case, thereby questioning its independence. The federal judges are the ones ultimately deciding the right and wrong in the issue and do not participate in the debate with any other groups, they are in that sense truly independent.

4.3.3 The Oil Sands Environmental Coalition and the Coalition

Before the judicial review

The groups involved in the negotiations around the KOS project before the judicial review of the Panel report were called the Oil Sands Environmental Coalition (OSEC). They are an association of three Alberta-based environmentalist groups: the Fort McMurray Environmental Association (FMEA), the Toxics Watch Society of Alberta (TWSA) and the Pembina Institute for Appropriate Development. These groups essentially have the same mission as governmental bodies such as AENV and EC. What is then their purpose and why do they exist? Glitches in the environmental assessment and the regulatory process might occur and independent bodies are necessary in order to act as both a consultant for better environmental management practices and as a watchdog for environmental and human health.

TWSA and the Pembina Institute were both created in the 1980s as a result of environmental stresses and problems affecting human health. The Pembina Institute was created in 1985 following Canada's largest public inquiry in the 1982 Lodgepole sour gas blowout that resulted in the death of two persons and heavy air pollution in Alberta

(Pembina Institute website). On their website, they describe their origins as "a small group of local residents [who] band[ed] together to press for higher safety standards in the oil and gas industry ... [and who were] empowered by the positive experience of citizen-lead action … to found the Pembina Institute in 1985." (Pembina Institute website) TWSA was created shortly after in 1986 "as 'a needed and timely response to the growing use of toxic chemicals in *our* province.'" (TWSA website). The FMEA is a local group to the city of Fort McMurray, which is located 70 km away from most large oil sands mining pits. OSEC can therefore be considered as a consortium of grassroots environmental movements.

However, TWSA and the Pembina Institute do not only perform advocacy activities as a reaction to environmental problems but they also provide consultancy services. They are hybrids in the environmentalist movement domain. On the one hand they will lobby to protect the environment and citizens and on the other hand they will provide expert advice on how to deal with industrial effects in an environmentally friendly way. The largest of these is the Pembina Institute with offices in several Canadian cities including the Capital. They are very active in providing environmental consulting expertise to several oil companies and have distanced themselves from a grassroots type organization towards a consultancy type enterprise.

During the judicial review

At this point, OSEC is not the group pursuing the KOS case it is now the Coalition. This term refers to the Pembina Institute, TWSA, and three important actors who were recruited for the legal pursuit. The Pembina Institute was however the group orchestrating it all. The Sierra Club of Canada, Ecojustice, formerly Sierra Legal Defence

Fund and the Prairie Acid Rain Coalition (PARC) were the new additions. While these are all environmentalist organizations, they are not of the same scope. On the one hand, PARC is another grassroots type organization whose most prominent member was Martha Kostuch. A retired veterinarian, she became an environmental activist after noticing the effect of oil industry's air pollution on cattle's reproductive system (Canadian Geographic Archives; Marshall, 2004, p.7). On the other hand, the Sierra Club is the oldest North-American group for wildlife conservation advocacy and it was founded by John Muir along with other American intellectuals in 1892. Its goals were "recreational, educational, and conservationist" (Cohen, 1988, Chapter 3). Through time, it became one of the leading groups for environmental advocacy in the U.S., it started acting in Canada in 1963 and was finally established in Ottawa in 1989 (Sierra Club of Canada website). Ecojustice only officially exists since September 2007 but had been active in Canada under the name of Sierra Legal for the last 17 years (Ecojustice website).

To sum up, the actors involved in the KOS story are very high-profile actors: the biggest oil company, the government, several grassroots environmental groups that can recruit larger influential groups like the Sierra Club. This makes this sensitive issue even more visible to the public and the story even more important.

The controversy around the KOS project lies mainly in the questioning of the environmental assessment process, which is there to insure the projects are in the interet of the public. It is also a dispute on uncertainties regarding predictions, technological

effects and environmental management, of which different groups have different visions. The following discourse analysis will provide a detailed look into each group's interests and strategies and will show how the judicial review participated in the social construction of an environmental problem.

4.4 The Negotiation of Uncertainties

4.4.1 Conflicting Views before the Trial

All the documents submitted to the Joint Panel are relevant to the making of the Panel report and also allow a better understanding of each group's discourses. The following documents were not in question as such in the trial since the judicial review only looked at the Panel report. However, the Judge did refer directly to Imperial Oil's EIA as it was a significant document in the making of the Panel report. Nonetheless, all of the following documents participated in the elaboration of both the EIA and the Panel report, making them thus relevant.

4.4.1.1 Terms of Reference

As previously mentioned, the terms of reference (TOR) is the document produced by the Agency, which provides an extensive list of information to be included in the proponents Environmental Impacts Assessment (EIA). The elaboration of the TOR is the first step in the environmental assessment process.

It was initiated on November 7, 2003 through a letter and public notice from Imperial Oil to the DFO, which stated that the KOS project had been initiated in 1997 by Exxon Mobil and would be resumed by Imperial Oil in 2003. A TOR that had been

drafted in 1998 was no longer valid in 2003. An interesting quote from the public notice is the following, "considering TOR have evolved for oil sands mining projects since then, as have certain aspects of the projects, Alberta Environment has determined that a more current TOR is needed." The necessity to revise the TOR after five years suggests that concerns in the field of environmental health have changed. A letter followed this public notice from the Agency to the DFO on November 18, 2003 requiring more information on impacts on fish and fish habitat and referring the DFO to an impact assessment biologist. On December 22, 2003, the Agency contacted AENV to invite them in a cooperative environmental assessment review of the project. This brought in new governmental bodies such as Environment Canada, Health Canada and Natural resources of Canada in the consulting arena. In this communication, the Agency also included a list of modifications that should be added to the TOR. These modifications concerned mostly the identification of environmental uncertainties and their management. Also the Agency demanded, "uncertainties [to] … be quantified whenever possible, or assigned to categories according to the degree of uncertainty" and " [to] provide statistical confidence limits or another quantitative measurement of uncertainty in predictive tools and methods". On the same day, the CEAA also contacted Imperial Oil to inform them that the DFO would be the main responsible authority. Then, on January 7, 2004, the DFO, as the responsible authority, urged Imperial Oil to provide more information in order to determine the level of environmental assessment. Finally, AENV published the final TOR on April 22, 2004.

In this final document, there is a 30 page long list of information the proponent has to present. Among the requirements, there are three types of activities that are

remarkable: (1) the identification of uncertainties and how to go about them, "Differentiate between emerging issues with uncertainties, issues with important environmental consequences and issues that can be mitigated through available technology and with existing management approaches. Describe how ongoing uncertainties and emerging issues will be addressed", (2) the adaptability of mitigation measures, "Identify any implications that those possible climate changes might have for the sustainability of the Project. Discuss any follow-up programs and adaptive management considerations" and (3) the specification of uncertainties through models, "Habitat models used to evaluate impacts should be modified/calibrated by comparing model predictions with wildlife data from the study areas".

There are several things notable in the elaboration of the TOR. First, only two groups were involved in its elaboration: the oil industry and the government. Second, it shows a one-way dynamic with demands from the government to Imperial Oil for what has to be in the EIA. Within the government, different bodies interacted regarding the content of the TOR but did so in unison. What really happens with the TOR is that the government creates a set of requirements that will frame the kind of discourse Imperial Oil will have in its EIA. The interests of Imperial Oil are to follow the directives in order to get their projects approved, whereas the government tries to provide a set of requirements that will insure that the project does not contain significant uncertainties with detrimental effects to both human and environmental health.

Regarding uncertainties, only the government's discourse is present. What can be observed about their request is that they regard uncertainties in a classical way requiring " a range of possible outcomes" (cf. Smithson, 1993; cf. Collingridge, 1980). Prediction

models and a science-based approach to uncertainties seem to have a very big part in how they deal with them. "More information" is an expression that comes up often and the requirement for expertise goes hand in hand with it. Another approach to understanding how the governmental bodies perceive uncertainties is that adaptive management is referred to directly, but also indirectly by establishing "environmental management procedures should monitoring indicate that mitigation strategies are not effective". Expertise and adaptive management are the lines of thought that the government seems to endorse at this initial stage of the environmental assessment process.

In terms of Wehling's dimensions (2006), the government's views on uncertainties could be qualified with a high score on the axis of *knowledge*, meaning that uncertainties have to be specified. This is motivated by the government's interests to provide a comprehensive list of issues to be addressed and clarified in order to make sure that the approval of the project is in everyone's best interests. On the axis of *temporality*, the government's discourse seems to consider uncertainties as temporary since management techniques such as prediction models, follow-up plans and adaptive management are sufficient answers to the specified uncertainties. Finally, on the axis of *intentionality*, uncertainties are unintended since in the discourse, there is no ambiguity that the government considers uncertainties as the inevitable side effects of industrial development.

4.4.1.2 Environmental Impacts Assessment

After the first step of elaborating TOR, Imperial Oil spent over a year producing its Environmental Impacts Assessment that was finally submitted to the former EUB of

Alberta and to AENV on July 1, 2005. The document consists of 9 volumes altogether covering technical, environmental, social and economical issues in the KOS project.

In the executive summary, Imperial Oil stated, "the environmental impact assessment concluded that, with mitigation and adaptive management, there would be no unacceptable environmental, health, or socio-economic effects from the project." (EIA, 2005, Vol.1 p. xix) and suggested that "the proposed Kearl Oil Sands Project - Mine Development is in the public interest of Alberta and Canada and requests that it be approved." (ibid.). The aims of Imperial Oil are to have their project approved and in the summary of a document which contains over 8000 pages their discourse needed to be assertive to leave no place for uncertainties. How did they develop such a firm conclusion? A closer look at the 9 volumes of the EIA will provide an insight into this discourse. Since it is a quite extensive document, the following part will be divided into the following themes: (1) interactions, (2) uncertainties, and (3) approaches to uncertainties.

Interactions with other actors

As a result of a multi-stakeholder process (EIA, 2005, Vol. 2 p. 2-5), the write-up of this document is a collaborative effort between Imperial Oil, other oil companies, citizen groups, the government and environmental NGOs (ENGOs). Consultants were also hired in the process. However, only the meetings between Imperial Oil, the government and the ENGOs are of interest for this study. In volume 2 of the EIA, it is stated that OSEC met with Imperial Oil on Sept 8, 2004 to discuss its involvement in the KOS project. On March 2, 2005, Imperial Oil met with the Pembina Institute, which

expressed its interest as a consultancy organization to participate in the KOS project although they will later reveal they did not have time to be involved (see part 4.4.1.3 of this chapter). On March 29, 2004, "Imperial Oil met with AENV to review the proposed EIA Terms of Reference. AENV indicated that new requirements would include: Climate Change, quantification of EIA modeling uncertainties, and discussion of mitigation measures for regional cumulative impacts." (EIA, 2005, Vol.2 p. 2-24-27).

The information from those meetings suggests the government's stronghold on the EIA. The lack of follow-up with environmentalists groups shows again their lack of power in influencing the environmental assessment process at this point in time.

Uncertainties

The most straightforward way to understand Imperial's vision of uncertainties is to look at the glossary. In the first volume's glossary, they defined the term: "uncertainty [as an] [i]mperfect level of knowledge concerning the present or future state of the system under consideration; a component of risk resulting from imperfect knowledge of the degree of hazard or of its spatial and temporal distribution" (EIA, 2005, Vol.1 Glossary p.8).

Although the executive summary seems to have left no place for uncertainties, the term does come up in the remaining of the EIA. It is interesting to highlight discrepancies in the use of this "imperfect form of knowledge" (Ibid.) concerning different issues within the EIA. It is always used in the sense in which it is defined, but different attitudes in different fields towards uncertainties, are visible.

In the economical domain, they put the following notice in the introduction, "Please note that this application contains forward-looking information on future production, project start-ups and future capital spending. *Actual results could differ materially* due to changes in project schedules, operating performance, demand for oil and gas, commercial negotiations or other technical and economic factors." (EIA, 2005, Vol. 1 p. 1-5). This acknowledges uncertainties and cites different parameters that could interfere with predictions.

In the engineering domain, technical and environmental uncertainties are used to dismiss technological alternatives. For example, the EIA is the required to provide alternative means of carrying out a task. For instance Imperial needed to use the water from the Muskeg River and suggested five ways of doing so, four including no river-diversion and one including river diversion. Three of the four no river-diversion alternatives were rejected on grounds of "a negative effect on the mine and external tailings area", "technical uncertainties associated with flushing pore water from tailings" and "a negative effect on a low-flow river, caused by seepage collection wells" (EIA, 2005, Vol. 1 p11-8). Here uncertainties are associated to the functioning of the technology and are a sufficient reason to reject an alternative. Moreover, the fourth no river-diversion alternative was also rejected mainly on grounds of environmental uncertainties since the "level of certainty with this alternative in ensuring protection of the natural aquatic systems along the upper reaches of the Muskeg River is considered low." (EIA, 2005, Vol. 1 p 11-14). The environmental uncertainties are presented here are as a "low certainty" demonstrating the importance of the knowledge dimension.

Therefore, the possible effects on the environment can be used as a reason for not using a particular technology.

What were then Imperial Oil's attitudes towards uncertainties in the environmental field? Imperial seemed to have three different levels of uncertainties in environmental topics: (1) the uncertainties about environmental parameters, (2) the uncertainties in predicting and (3) the uncertainties about environmental mitigation.

Uncertainties about environmental parameters were present in Imperial's EIA. For example, air quality is a big issue. Imperial states, "there remains uncertainty about the sources of ozone in northeastern Alberta. There are several plausible, but contradictory theories regarding ozone formation in northeastern Alberta, which are not being addressed by current research" (2005, Vol. 5 p. 2-146) and "uncertainties remain with some of the individual TRS[8], VOC[9], PAH[10] and metal species; however the best available regional data was used to represent these compounds in the assessment" (2005, Vol.5 p.2-172). The available data and conservative estimates were sufficient and did not hinder them from proceeding with their predictions since "there is high confidence that the dispersion model and the modelling approach used will provide conservative air quality predictions" (2005, Vol. 5 p.2-116).

Since the available data was uncertain, there would be uncertainties in future estimates added to the imperfect nature of prediction models. Imperial heavily used mathematical models to correct predictions about environmental effects like CALPUFF or predict what the baseline would be without industrial development like RELAD (2005, Vol.5, p. 2-134-135; Vol. 5 Appendix 2B). Also, "both sensitivity analyses and a rigorous

[8] Total reduced sulfur
[9] Volatile organic compounds
[10] Polycyclic aromatic hydrocarbons

analysis of model uncertainty were used to quantify the degree of uncertainty in the model output, and to strengthen the confidence in model results"(2005, Vol. 6, p. 3-16). Here the key word is confidence. The attitude about uncertainties in predictions therefore has the aim of transforming uncertainties into certainties through mathematical transformations. This approach to uncertainties is widely used and recognized in environmental assessment and supported by AENV (2005, Vol.5, p. 2-134-135).

Finally, uncertainties mitigation scenarios result from all those previous uncertainties. For instance "uncertainty in the composition and structure of reclaimed upland and wetlands communities makes it difficult to assign specific ecosite phases or wetlands types (or associated wildlife biodiversity index values) to the reclaimed landscape" (2005, Vol. 7 p.4-7). Also, "effects on vegetation resulting from changing climates might affect certainty of reclamation goal achievement" (2005, Vol. 7 p. 4-9). What is noticeable from these quotes is that uncertainty became a justification for an uncertain reclamation plan and schedule[11].

Imperial Oil had different attitudes to uncertainties among fields and talked about environmental uncertainties at different levels. In the environmental field Imperial Oil approached uncertainties firstly as unknown ecosystem parameters in the case of effects and future mitigation and secondly as correctable mathematical objects. The diverse outlooks on the term uncertainty involved a set of rhetorical tools around this notion. Stocking and Holstein (1993, p.192) talk about rhetorical tools for ignorance claims. Among them are caveats, where scientists recognize their limitations in their findings and

[11] What is surprising is that climate change is considered as something external to the activities of Imperial Oil and treated as a variable creating uncertainty in mitigation plans. Meanwhile Imperial is also contributing to greenhouse gases emissions and is required to mitigate them as well as it is recognized that they contribute to climate change. Although it is not the sole contributor to greenhouse gases, it still has a local responsibility in climate related issues.

thereby explain they have done the best they could. This sort of rhetoric is the one Imperial used when talking about uncertainties. "Conservative predictions" and uncertainty analyses contributed to showing caveats and thereby bringing credibility to the ignorance/uncertainty claims.

Approaches to uncertainties

As a means of responding to uncertainties, Imperial used two related concepts. First, they showed a strong trust in scientific 'progress' and second they only relied on adaptive management to answer to uncertainties. Imperial's trust in research and development is clearly stated such as in Volume 7, they mention "ongoing research [which] continues to address areas of uncertainty in the system." (2005, Vol. 7, p. 3-52). Expertise is central to specifying uncertainties. Therefore Imperial Oil invested considerable amounts of money in R&D like its $10 million contribution to the *Imperial Oil Centre for Oil Sands Innovation* at the University of Alberta whose "mandate … is to find more efficient, economically viable and environmentally responsible ways to develop Canada's oil-sands resources" (2005, Vol. 2 p.4-6).

Hand in hand with expertise comes adaptive management. Defined as a six-step cycle in the EIA it entailed the following:

- "assessing the risk of potential challenges, uncertainties and opportunities
- incorporating design elements that accommodate challenges, contingencies and knowledge acquisition
- implementing the design
- monitoring key indicators

- evaluating performance
- incorporating knowledge gained into existing processes and the design of future facilities and operations" (2005, Vol.1 p.2-41)

Although it is clearly defined, Imperial did not discuss the shortcomings of adaptive management like the extent of monitoring needed, the stability of uncertainties and the limiting frames in which adaptive management understands a system (see chapter 2, this work). Instead it was one of its core principles for reclamation (2005, Vol 7. p. 4-82).

Not only did Imperial ignore the shortcomings of its approaches to adaptive management, it also ignored the limitations of the expertise model developed by Van der Daele (see chapter 2, this work). Imperial's trust in "on-going research" showed their belief that if experts discuss enough within their community they will find a solution. Imperial nonetheless used a multi-stakeholder process, which included lay-knowledge. However, since they seemed to rely mostly on the scientific community to find solutions, the multi-stakeholder process may need improvement. All in all, Imperial has a classical view of uncertainties. The outcomes are known but their probability of occurring is not and they are linked to risk. In terms of Wehling's dimensions, Imperial's vision of uncertainties appears to be highly specified, temporary and unintended.

The discourse about uncertainties was accompanied by a discourse of controllability. It is seen in the attitudes toward the notion of uncertainties for instance as something correctable and also in the approaches to dealing with uncertainties using expertise and adaptive management. In addition, Imperial Oil referred to the work that has been done by governmental and non-governmental initiatives (CEMA and Regional

Sustainable Development Strategy) and "the main environmental concerns associated with the Kearl project are similar to those previously identified and currently managed by the oil sands industry." (EIA, 2005, Vol. 1 p. 2-35). Also Imperial stated, "for most aspects of these projects, the project components and environmental interactions are well understood." (EIA, 2005, Vol. 1 p. 2-41). Their discourse shows that environmental issues are known and understood, therefore controllable. Strategically speaking, they created themselves what Latour would call allies (cf. Latour, 1988). Imperial seems to put a lot of effort in specifying uncertainties in order to provide an impression of controllability over this "component of [environmental] risk" (2005, Vol.1, Glossary p.8). Rhetorical tools like caveats and allies along with their vision of uncertainties all work for their interests, which are to see the KOS project resume.

Summary

So far in the story even before the EIA was produced, it was predictable that Imperial and the government would have the same vision of uncertainties since the TOR had a framing function. The previous analyses showed how Imperial succeeded in keeping the same discourse as the government about uncertainties through rhetorical tools like using caveats and allies and by having a similar vision of uncertainties to the government by relying on expertise and adaptive management. In this way, Imperial and the government's interests seem to be mutually fulfilled.

4.4.1.3 Initial Exchange between OSEC and Imperial Oil

After the submission of the EIA, different groups were invited to voice their opinion to the Joint Panel. On October 31, 2005, OSEC sent a letter (Statement of concern) to AENV and EUB, with a copy to the Panel. In this letter, they supported that the KOS project is not in the public interest and undertook the position that no oil sands project should be "considered" until a regional planning for oil sands development would be put into place. They also wrote that they had been too busy to fully participate in the EIA as consultants but wanted to contribute through the Review Panel. Moreover, documents showed that OSEC was one of the four organisms to receive federal funding to produce their contribution to the Review Panel.

In the letter, they cited the "significant uncertainties regarding the recently announced Mineable Oil Sands Strategy and its implications for the Muskeg River Watershed and the work of the CEMA" (p.1-2), which are environmental mitigation frameworks and management organisation. More precisely, they expressed concern towards the "insufficient resources … dedicated to research, development and the piloting of alternative technologies offering superior environmental performance" (p.2), " Imperial Oil's plans to disturb such a large area and base their mitigation strategy on uncertain reclamation strategies and approaches." (p.2), "the high levels of uncertainty in their ability to successfully reclaim its in-pit tailings and create a viable, maintainance free and ecologically sustainable end pit lake." (p.5), "[the current impossibility] to predict whether this approach to MFT[12] management will prove adequate or successful, and whether it will have long term negative environmental implications" (p.5), "[the lack of assessment by Imperial Oil] regarding the risks of potentially mining in proximity to

[12] Mature Fine Tailings

undiscovered buried channels" (p.5) and finally, their lack of a specific plan for greenhouse gases emissions.

The discourse of OSEC regarding the EIA underlined the significant uncertainties regarding mitigation plans in various domains. Also, they supported the advancement of science and alternative technologies to provide an environmentally friendly development of oil sands. However, as long as the mitigation plans and appropriate technologies were not fully understood, OSEC endorsed a precautionary approach that condoned the arrest of further project approvals. This discourse reveals an approach that regards uncertainties as specified although they are not as specified as in the government's or the industry's discourses. They also left place for interpretation regarding unknown uncertainties with formulations like "[the current impossibility to predict] long term negative environmental implications". What this also lets transpire from OSEC's discourse is that they do not consider uncertainties as being as strongly temporary as Imperial's view. According to OSEC's discourse, uncertainties can also be seen as stable when considered in the contemporary context. Lastly, uncertainties are also unintended since they are the result of the intensive industry.

To this statement of concerns, Imperial Oil emitted a response on August 6, 2006. While OSEC's document took the form of a letter, Imperial's document was a report systematically addressing the points raised by OSEC. In this document, Imperial quoted OSEC directly, therefore using the rhetorical strategy of echoic speech (Stocking and Holstein, 1993, p.193) contributing to the demonstration of controllability. By taking OSEC's arguments point by point, they aimed at showing they did have all the answers. The way they addressed uncertainties also highlights the difference in discourses between

the industry and the environmentalists. Imperial had an extremely assertive tone about uncertainties such as, "ongoing research is demonstrating that reconstructed soils are returning to equivalent capability." (p.4), "uncertainty analysis performed on the project's proposed pit lakes demonstrated that the predictions are robust and that they will achieve acceptable water quality (see Volume 6, Section 5.9.5.2 and Appendix 5A)" (p.3) and "the recognition that adequate time is available to progressively apply successive learning's from ongoing research and modelling and resolve uncertainties before and after the first pit lakes are completed" (p.4). These examples show the central role of science and expertise to Imperial's approach, and thereby strengthen their view of specified, unintended and temporary uncertainties (Wehling, 2006). The same rhetorical tools as in their EIA, i.e. caveats and allies with addition to the echoic speech, also support their assertive tone.

4.4.1.4 Official Submissions to the Panel

OSEC

Nonetheless, these answers did not satisfy OSEC's concerns. On November 12, 2006 they submitted through their lawyer a 900 page long document to the Panel Review in which they also undertook a firm tone requesting, "that the approval of the application for the Imperial Kearl project … be denied on the basis that it is not in the public interest." (p.7). The core of the document is of 50 pages and contains a list of approval conditions to the project, a list of recommendations to the Panel and the bulk of the document is a discussion of presented results by Imperial Oil. The remaining pages are scientific reports from various consulting sources.

The approval conditions section had nothing to do with uncertainties but everything to do with certainties such as requiring Imperial "to develop and submit a conservation offset mitigation strategy for terrestrial disturbance" (p.8), to "demonstrate how biodiversity monitoring in accordance with the protocols of the Alberta Biodiversity Monitoring Program will be incorporated into the Project's environmental monitoring systems" (p.9) and "to provide the evaluation of the significance of air quality in relation to the guidelines and standards accepted by the Province of Alberta that was called for in the Terms of Reference for the project" (p.9) The recommendations to the Panel can be summarized in three sections. First the need for transparency from all parties industry and government, second the integration and monitoring of the project in recognized frameworks and finally, the use of scientific techniques OSEC judged more appropriate for predictions. The aims of these recommendations are to provide a strict regulatory frame to the KOS project. Lastly, OSEC discussed misrepresentations of scientific information in the EIA for instance comparing greenhouse gases emissions intensity from the Kearl Project with projects that are not its equivalent (see Appendix C for excerpt).

In this document, it is interesting to notice that OSEC started talking more directly about risks. OSEC stated, "in the absence of thresholds, a true assessment of the environmental impacts associated with proposed projects cannot occur, and proponents are left to assess the environmental risk associated with a project" (p.22) and "air quality guidelines and standards act as a means of evaluating risk to plants, animals, ecosystems, and humans" (p.33) thereby emphasizing the need of certainty before proceeding with a project that could turn out having significant risks. They therefore took another angle to their precautionary approach. In their initial letter, their differing view of uncertainties

justified precaution. In this document, OSEC barely mentioned uncertainties in its core document. However the appendices they joined to their document contain expert reports supporting their claims, uncertainties are presented and mentioned. OSEC therefore seems to make a transition from addressing uncertainties to addressing certainties and potential risks to emphasize the need for precaution in the KOS project as a reaction to Imperial assertive tone towards OSEC's vision of uncertainties. OSEC therefore does not change its discourse about uncertainties itself, but endorses a discourse where the approval or denial of the KOS project depends on the proponent's ability to specify their uncertainties and to prove how they can be overcome. In their effort to make themselves understood by the Panel, they also use echoic speech to discredit Imperial's arguments. OSEC shows flexibility in its strategies in order to attain its goal, which is to have Imperial Oil be denied approval for the KOS project.

The Government

The DFO and EC also presented submissions to the review Panel respectively on June 1, 2006 and October 1, 2006. The DFO met with Imperial Oil to develop a No Net Loss plan (NNL), which Imperial Oil published. This plan involved the condition for Imperial Oil to create a 2:1 compensation ratio for fish loss created by the KOS project, which is also legally necessary for the approval of the project. The document itself did not directly address uncertainties but was rather concerned with the uncertainties in predicting effects and how they should be dealt with. In its series of recommendations, follow-up programs insure that predictions are met and mitigations are efficient.

Another document submitted by the government summarized the points of concern of EC, the DFO and Health Canada (HC). Although they clearly expressed their

concern over specific issues, they also formulate what they expect from Imperial Oil and the Panel's decision, "in closing, DFO, EC and HC welcome this opportunity to share our views with the Panel and so provide this information for its consideration in reaching a decision with respect to the Kearl Project" (p.150). As opposed to OSEC, they did not oppose or support the project. They only expressed their concerns and the measures they believed appropriate to remedy to those issues. The government's vision of uncertainties is mainly visible through its approach to the management of potentially adverse environmental effects, which is mainly monitoring, further research and adaptive management. Uncertainties are therefore still seen as temporary, unintended and specified (Wehling, 2006) like it was suggested already in the TOR.

4.4.1.5 Panel Report and the Decision

No written answer was given to OSEC's submission or any other submissions. During the public hearings OSEC presented on November 16, 2006 a PowerPoint document explicating Imperial's water use and the resulting problems. After receiving submissions and viewing presentations from different groups like First Nations and other oil companies, the panel produced its own report on February 27, 2007. The Panel report provided a summary of all issues raised and each group's viewpoint, followed by the Panel's own opinions and recommendations.

What appeared through the Panel report was that the only discourse about uncertainties left was about the management of environmental effects. "The Joint Panel has made the decision that the KOS Project is in the public interest, but it must be clearly

understood that the lack of certainty related to the management of cumulative impacts for key environmental parameters … on the region have weighed heavily in this process." (p. 4). Nonetheless, "the Joint Panel has concluded that the project is not likely to cause significant adverse environmental effects, provided that the proposed mitigation measures and the recommendations of the Joint Panel are implemented." (p.5) These mitigation measures included for the larger part the ones suggested by the different governmental bodies, i.e. monitoring and adaptive management. For their success, the Panel recommended a stronger involvement from EC and AENV in the implementation of regulatory frameworks (p.5). An interesting aspect to the monitoring process, which appeared in the Panel report, was the notion of the control dilemma. For instance, the Panel insisted, "monitoring should be carried out to ensure that impacts on fish and fish habitat … [be] mitigated at the *earliest stage possible* to ensure that the cumulative impacts on the Muskeg River watershed are *minimized*." (p.86) This means that if the monitoring is not done properly, the cumulative impacts could be difficult to mitigate. Although Imperial did not recognize the pitfalls of their approach, the Panel stressed the necessity of carrying out mitigation plans properly. Generally, adaptive management seemed to be the approach to deal with uncertainties, which satisfies the Joint Panel. This suggests that the Joint Panel has a similar view on uncertainties as the government and the industry.

After this favourable report for the KOS project, the government of Canada accepted the Panel's conclusions and all regulatory duties of monitoring that they recommended on August 1, 2007. The DFO granted approval to the KOS project.

While environmentalists groups endorsed a precautionary approach, the industry and the government favor an adaptive management approach in dealing with environmental problems. In chapter 2, adaptive management was presented as a tool to overcome the paralyzing effects of the precautionary principle. In this case however, the conflicting visions of uncertainty influence how each group believes they should be dealt with and what is acceptable for the environment. In that sense, their differing visions lead to conflict. The industry mostly has economical development for goals but is also interested in environmentally sound development. The government has economical development in mind as well because it is positive for the economy but it also obviously has environmental health, as stated in the laws. Environmentalists also have environmental health in mind and are not opposed to economical developments as long as it does not damage environmental health. All parties then share, to different degrees, the same goals. It is then their conflicting views on uncertainties that have been left unresolved through the environmental assessment process that ultimately lead to a legal dispute.

4.4.2 Differing Views of Uncertainties settled in Court

4.4.2.1 The Coalition's Affidavit

Shortly after the publication of the Panel report on March 29, 2007, the Coalition (see section 4.3.3) filed a judiciary review against Imperial, the Panel and the Government for unlawful environmental assessment. Simon Dyer of the Pembina Institute was the main actor in this trial along with Sean Nixon, the environmental lawyer from Ecojustice. He made his affidavit on January 11, 2008 talking about Imperial Oil's

environmental management plans and referring the Panel's recommendations as "phantom mitigation" (p.5). The Coalition accused the Panel of not addressing the issue of what would happen to significant adverse environmental effects in the case that the mitigation plans did not work. The uncertainty of mitigation plans was only addressed through adaptive management and monitoring, whereas the Coalition demanded "technically and economically feasible measures" (p.2) and expressed its concerns on the regulatory frameworks like CEMA that have consistently failed to set environmental thresholds and be on time for their commitments. To the Coalition, this demonstrated a lack of precaution in the management of the oil sands development.

As the Coalition was going to court, a more assertive and even more aggressive tone was necessary. This is underlined by the use of ironic reversals using terms like "phantom mitigation". By opposing the Panel's approach to uncertainties, the Coalition reiterated its conflicting vision of uncertainties with the other groups, who so far have been on the same page. The Coalition's views on uncertainties are the same as OSEC's, putting forward a precautionary approach, i.e. uncertainties are not so specified, more likely stable than temporary and unintended.

4.4.2.2 The Ruling

The judicial review took place in Edmonton, during three days starting on January 15, 2008. Justice Lamer-Tremblay was the federal judge appointed to this case and she decided the case on March 5, 2008 in Ottawa. As mentioned earlier, it was a partial victory for the Coalition since the Judge ruled that the rationale regarding the impact of greenhouse gases emissions was unsatisfactory and demanded that the Panel re-do it. There are two main parts to this document. First she explained her interpretation of the

CEAA and second she delivered her ruling analysing the plaints against the report, the EIA and the CEAA principles, as she understood them. The plaints presented in Simon Dyer's affidavit were subdued into three main issues of contention: a) Cumulative Effects Management Association (CEMA), Watershed Management and Landscape Reclamation, b) Endangered Species and c) Greenhouse Gas Emissions.

In the ruling, the environmental assessment process is described as a two-step decision-making process. The first one is an information-gathering step and the second one is a decision-making and follow-up step. She claimed that the basic concepts behind environmental assessment are the "early identification and evaluation of all potential environmental consequences of a proposed undertaking" and sustainable development (para.15). In paragraph 22, she underlined, with the help of jurisprudence, how environmental assessment "is not a wholly objective exercise but rather contains 'a large measure of opinion and judgement.'" What the Judge also made apparent from this value-laden aspect of environmental assessment is the control dilemma, insisting that assessment must take place " 'as early as is practicable in the planning stages … and before irrevocable decisions are made'" (para.23). However, she also insisted that "finality and certainty in environmental assessment can never be achieved." (para.23). Nonetheless, an important aspect of environmental assessment was to provide "technically and economically feasible" mitigation measures (para.26) Further into her interpretation of the law, she described the two "guiding tenets to environmental assessment: the precautionary principle and adaptive management." (para.33) Also, "as an early planning tool, environmental assessment is tasked with the management of

future risk, thus a review panel has a duty to gather the information required to fulfill this charge." (para.33)

In the evaluating the plaints, the Judge referred to the precautionary principle several times. For instance, the plaints regarding CEMA as being inadequate to carry out mitigation measures were rejected. The Judge interpreted the role of CEMA as a "vehicle for the development of environmental management frameworks" (para.44). Also, she invoked the precautionary principle with regards to the use of CEMA in the sense that it was backed up by AENV in the event that it was "unable to meet its timelines for management frameworks" (s.45). Here the precautionary principle is understood as a back-up plan. It is however odd that the precautionary principle be applied to a management framework, which is not considered as a mitigation measure.

The precautionary approach was further used in another situation. The Coalition suggested tailings thickeners were not an economically and technologically feasible technology and Imperial therefore relied on unproven technologies for mitigation plans. However, Imperial defended that this was not their only technology available and that they were working on it. The Judge therefore ruled that not developing tailings thickeners would "stifle innovation in the field, which could potentially result in future benefits to the environment" (para.54). Ironically, in that case, we see a contradicting application of the precautionary principle. One the one hand the environmentalists referred to the principle in demanding full certainty on mitigation issues before approval is granted. On the other hand Imperial and the Judge referred to the precautionary principle in the sense that the lack of full certainty cannot be used as a reason against taking potentially beneficial mitigation measures.

The environmentalist groups also put adaptive management in question. Imperial claimed the use of adaptive management would help them reclaim lands whereas the environmentalists affirm that there was not enough that was known to begin applying adaptive management. However, the Judge ruled that there was enough knowledge about wetlands and stated that "while uncertainties with respect to reclamation of peat-accumulating wetlands remained, they could be addressed through adaptive management given the existence of generally known replacement measures contained in Imperial Oil's mine closure plan." (para.62). Solely the Judge and her appreciation of the Panel report decided the question of how much knowledge is enough. This underlines the highly value-laden character of decision making under uncertainties.

The argumentation of environmentalists groups on the precautionary principle and adaptive management were unsuccessful. The views of Imperial Oil corresponded more to the Judge's vision and the Coalition therefore failed to convince her. However, the Coalition won on one point, which were greenhouse gas emissions. They accused the Panel of not providing a rationale for stating that GHG emissions would not have significant adverse environmental effects. The Judge referred to the Panel as a consortium of experts possessing enough information to provide a rationale for their decisions. She also referred to jurisprudence quoting, "Experts, in our society, are called that precisely because they can arrive at well-informed and rational conclusions. If that is so, they should be able to explain, to a fair-minded but less well-informed observer, the reasons for their conclusions. If they cannot, they are not very expert. If something is worth knowing and relying upon, it is worth telling. Expertise commands deference only when the expert is coherent. Expertise loses a right to deference when it is not

defensible." (para.75). Given that the Panel had the means to give a rationale but did not, she was "of the view that the Panel erred in law by failing to provide reasoned basis for its conclusion as mandated by s. 34(c)(i) of the CEAA." (para.79). The Panel was therefore ordered to review its rationale for this particular point.

Although there is clearly a great amount of values in the judgment, the ruling was still strongly based on trust in science and scientific progress dismissing the views of the Coalition in favor of the views of Imperial and the government. It was really a question of differing views of uncertainties rather than an issue where facts were disputed. The Judge did not look into conflicting scientific information, neither in potentially inaccurate scientific information. The way this conflict was analyzed also did not reveal a case of vested interests. Rather, it was really a conflict due to value differences. The Coalition's view was one against the industry and the government. The Coalition's views however succeeded in the social construction of an environmental problem by putting it through a legal dispute (cf. Hannigan, 2006, p.73ff) and thereby bringing their vision to the forefront.

4.4.2.3 Panel's Addendum

On May 6, 2008, the Panel published its addendum as required by the Court. Instead of the three members, only two participated since one of them, from the former EUB, had retired. In their addendum, the Panel first presented the issue like a misunderstanding of their initial report aiming "to better communicate its rationale for its conclusion regarding air emissions, including GHG". Also, they set out to explain their rationale for not only GHG emissions but also other air emissions. For GHG emissions,

the Panel listed twelve actions taken by Imperial to mitigate their emissions and supported that they were sufficient although Imperial had not specifically outlined a management plan for GHG emissions. The Panel also considered that provincial and federal frameworks for managing GHG emissions should take care of regulating GHG emissions and that "adaptive management will be required by Imperial to meet the forthcoming GHG emissions intensity targets." There again, the Panel stayed consistent to its approach before the judicial review.

Epilogue

The KOS project was finally granted approval by the DFO on June 5, 2008.

In an interview with a representative for an environmental group, the interviewee said the Panel's addendum was an "an insult" and that environmental groups would not pursue further action because they thought they could not win. It was apparent from the interview that the differing views of uncertainties create a true misunderstanding between the different groups and therefore make the negotiation processes extremely difficult because there seem to be no common grounds.

5. Conclusion

How do the different parties involved in the KOS case deal with uncertainties? Basically, there were two main visions of uncertainties. Although there were more than two actors groups involved, they all seemed to line up behind one or the other approach. The first approach, in terms of Wehling's dimensions, was a specified, temporary and unintended vision of uncertainties, or in other words a classical approach to uncertainties. It relied strongly on expertise to solve problems in time and on adaptive management to implement more appropriate and even newer techniques for environmental impacts mitigation. The Government, the oil industry, and the independent actors, i.e. the Joint Panel and the Judge, seemed to find this approach satisfactory and actively undertake it throughout the KOS story. The second approach viewed uncertainties also as unintended but at the same time as not so specified and more stable positioning itself in an opposite way on the knowledge and temporality dimension. This second approach strongly emphasized the unknown and thereby justified the use of a precautionary approach to uncertainties also backed up by considerable amounts of expertise. This is more consistent with Beck's ideas of the *Risk Society* since side effects of industrial development are unintentional (unintended), unseen (not specified) and compulsive (neither stable nor temporary). The environmentalist groups undertook this discourse. Yet, both views appeared to consider not-well managed uncertainties as potential risks.

In those two visions there were however misunderstandings. The precautionary approach is understood in two different and opposing fashions. On the one hand, it is seen as a precautionary tool for the environmentalist groups to halt potentially harmful and irreversible consequences and on the other hand, the Judge ruled that the use of

adaptive management and expertise is precautionary. The discrepancies concerning the precautionary principle underlined by Foster et al. (2000) are highly visible here. Although the principle is defined in Canadian laws, the KOS case shows that this definition still leaves room for interpretation. However, environmentalist groups did not succeed in putting their interpretation of the law forward.

Ultimately, the differing views on uncertainty of all involved actors could be seen as strategic tools. Yet, they do not seem to be very influenced by each other in their views. Instead, as presented in the previous paragraphs, the views and strategies were and remain different. In addition, while the oil industry is strong in creating allies with other actor groups, the environmentalist groups seem to stand-alone. Regarding their internal consistence, all groups showed firm positions on how they viewed uncertainties and how they should be dealt with, each helped by amounts of expert-produced scientific evidence. This shows that knowledge is not the issue here but that values rather are.

All in all, why and how does the legal negotiation process contributed to the social construction of an environmental problem? Bringing an oil sands project in front of a court of justice was a big step. Firstly, it brought national attention to the case that included high-profile actors, giving recognition to the oil sands exploitation and the related environmental consequences. Secondly, the Judge's decision then became jurisprudence and leaves a precedent for further cases where approaches to environmental uncertainties would be debated. This therefore sets a reference for the use of the precautionary principle and adaptive management in Canada. Adaptive management is a North-American concept and it is well established in the environmental assessment and environmental management's psyche. The precautionary principle/approach is a

European concept that encounters variability even in Europe. Its new addition to the Canadian legal and political spheres still needs experience and defining. The KOS case is therefore very important to that end and sets a trajectory on how to deal with environmental problems. The environmentalist groups seemed to refer to a precautionary approach rather than the precautionary principle, but the Judge answered them on the basis of a precautionary approach/principle. Perhaps actors should work on differentiating those two concepts in order to change the "path" that the KOS case has set for the precautionary approach/principle.

At the beginning of this work, I postulated the following thesis: in the social construction of environmental uncertainties around the KOS controversy, the ways these were addressed differed between the parties involved. Moreover, each party referred to uncertainties ambiguously for its own purposes. This thesis is partly supported by the case study. In fact, each group did have different ways to address uncertainties for their own purposes, or rather values, however, they addressed them in an unambiguous way, sticking to their guns and allowing little place for negotiation.

In the end, the case itself was not a trial were facts were disputed. There were no experts supporting contrary claims and this is even more supported by the observation that the intentionality dimension (Wehling, 2006) did not show any variations. The current case did not allow showing whether certain groups would have had interests in hiding facts. To the contrary, everybody seemed to openly agree on the facts base of issues like air quality, wetland reclamation, etc.

However, the different groups did not agree on how to go about these potential problems. Therefore, it was essentially a controversy on what is acceptable or not and this

thereby shows that scientific facts alone are not enough to meet a decision and that values play an important role. Although the Judge recognizes the value-laden quality of environmental assessment, the value she seemed to favor was the trust that current expertise and science was sufficient and precautionary. This opposes a precautionary approach, which would rather wait for more appropriate information to make a decision, as defined by environmentalists groups. In the end, this important decision on how to evaluate the acceptable level of uncertainties was left for only one person to weigh.

References

Primary Sources

AENV. (2004). *Final Terms of Reference*. Retrieved August 17, 2008 from the World Wide Web: <http://www.ceaa-acee.gc.ca/050/DocViewer_e.cfm?DocumentID=18752 >

Canada-Alberta Agreement on Environmental assessment cooperation. Retrieved August 17, 2008 from the World Wide Web: http://www.ceaa.gc.ca/010/0001/0003/0001/0001/index_e.htm

Canadian Environmental Assessment Act. Retrieved August 17, 2008from the World Wide Web: http://laws.justice.gc.ca/en/C-15.2/

Canadian Environmental Assessment Agency. (2003). *Canadian Environmental Assessment Act: Federal Coordination Regulations Referral*. Retrieved August 17, 2008 from the World Wide Web: http://www.ceaa-acee.gc.ca/050/DocViewer_e.cfm?DocumentID=18726

Canadian Environmental Assessment Agency. (2003). *Invitation to participate in a cooperative environmental assessment review of the project*. Retrieved August 17, 2008 from the World Wide Web: http://www.ceaa-acee.gc.ca/050/DocViewer_e.cfm?DocumentID=18741

Canadian Environmental Assessment Agency. (2003). *Responsible authority determination*. Retrieved August 17, 2008 from the World Wide Web: < http://www.ceaa-acee.gc.ca/050/DocViewer_e.cfm?DocumentID=18743>

DFO. (2004). *Federal environmental assessment and the Responsible Authority*. Retrieved August 17, 2008 from the World Wide Web: http://www.ceaa-acee.gc.ca/050/DocViewer_e.cfm?DocumentID=18751

Environmental Protection and Enhancement Act. Retrieved August 17, 2008 from the World Wide Web: http://www.qp.gov.ab.ca/Documents/acts/E12.CFM

Government of Canada. (2006). *Federal department submissions*. Retrieved August 17, 2008 from the World Wide Web: < http://www.ceaa-acee.gc.ca/050/DocViewer_e.cfm?DocumentID=18846>

Imperial Oil and DFO. (2006). *Kearl Oil Sands Project - Mine Development - Draft No Net Loss Plan Report*. Retrieved August 17, 2008 from the World Wide Web: http://www.ceaa-acee.gc.ca/050/DocViewer_e.cfm?DocumentID=18832

Imperial Oil Resources Venture Limited v. Minister of Fisheries and Oceans (2008 FC 598) T-460-08. Date May 14, 2008.

Imperial Oil Resources Venture Limited v. Minister of Fisheries and Oceans (2008 FC 382) T-460-08. March 27, 2008

Imperial Oil. (2003). *Public Notice – Proposed Revised Terms of Reference*. Retrieved August 17, 2008 from the World Wide Web: <http://www.ceaa-acee.gc.ca/050/DocViewer_e.cfm?DocumentID=18724>

Imperial Oil. (2005). *Environmental Impact Assessment Volumes 1-9*. Retrieved August 17, 2008 from the World Wide Web: http://www.ceaa-acee.gc.ca/050/DocHTMLContainer_e.cfm?DocumentID=18778

Imperial Oil. (2006). *Responses to OSEC Statement of Concern*. Retrieved August 17, 2008 from the World Wide Web: http://www.ceaa-acee.gc.ca/050/DocViewer_e.cfm?DocumentID=18857

Joint Review Panel. (2007). *Joint Panel Report*. Retrieved August 17, 2008 from the World Wide Web: http://www.ceaa-acee.gc.ca/050/DocViewer_e.cfm?DocumentID=21349

Joint Review Panel. (2008). *Addendum: Joint Panel Report (Rationale)*. Retrieved August 17, 2008 from the World Wide Web: http://www.ceaa-acee.gc.ca/050/DocHTMLContainer_e.cfm?DocumentID=26766

OSEC. (2005). *Statement of Concerns*. Retrieved August 17, 2008 from the World Wide Web: http://www.ceaa-acee.gc.ca/050/DocViewer_e.cfm?DocumentID=18806

OSEC. (2006). *OSEC Submission*. Retrieved August 17, 2008 from the World Wide Web: <http://www.ceaa-acee.gc.ca/050/DocViewer_e.cfm?DocumentID=18934>

Pembina Institute for Appropriate Development v. Canada (Attorney General) (2008 FC 302) T-535-07, Date: March 5, 2008

Secondary Sources

Adams, M. D. (2002). The precautionary principle and the rhetoric behind it. *Journal of Risk Research*, 5, 301–316.

Alberta Geological Survey. Retrieved September 29, 2008 from the World Wide Web: <http://www.ags.gov.ab.ca/GRAPHICS/CBM/oil_sands/alberta_oil_sands_map2.jpg>.

Balzano, Q. and Sheppard, A.R. (2002). The influence of the precautionary principle on science-based decision-making: questionable applications to risks of radiofrequency fields. *Journal of Risk Research,* 5, 351 -369.

Beck, U. (1992). *Risk Society: Towards a New Modernity*. New Delhi: Sage

Beck, U. (1996). Risk Society and the Provident State. In S. Lash, B. Szerszynski, & B. Wynne (Eds.), *Risk, environment and modernity. Towards a new ecology* (pp. 27–43). London: Sage

Bendell-Young, L. I., Bennett, K. E., Crowe, A., Kennedy, C. J., Kermode, A. R., Moore M. M., Plant, A. L. and Wood, A. (2000). Ecological Characteristics of Wetlands Receiving an Industrial Effluent. *Ecological Applications*, 10, 310-322.

Canadian Geographic Archives. Retrieved August 9, 2008 from the World Wide Web: http://www.canadiangeographic.ca/cea/archives/archives_individual.asp?id=55

Cohen, M.P. 1988. *The History of the Sierra Club: 1892-1970.* Sierra Club Books Retrieved August 9, 2008 from the World Wide Web: http://www.sierraclub.org/history/origins/

Collinridge, D. (1980). *The Social Control of Technology*. New York: St. Martin's Press: London.

Douglas, M. and Wildavsky A. (1982). *Risk and Culture: An Essay on the Selection of Technological and Environmental Dangers*. University of California Press

Ecojustice website. Retrieved August 9, 2008 from the World Wide Web: http://www.ecojustice.ca/about-ecojustice/history

Environment Canada guidelines on the Precautionary Principle/Approach. Retrieved August 11, 2008 from the World Wide Web: <http://www.ec.gc.ca/econom/booklet_e.htm#12>.

European Commission Communication on the Precautionary Principle. 2000

Ewald, F. (1991). Insurance and Risk. In Burchell, G., Foucault, M., Gordon, C. and Miller, P. (Eds.) *The Foucault Effect: Studies in Governmentality : With Two Lectures by and an Interview With Michel Foucault.* (pp.197-210). University of Chicago Press.

Foster, R.K., Vecchia, P., Repacholi, MH. (2000). Risk Management: Science and the Precautionary Principle. *Science*, 288, 979 – 981.

Groß, M., Hoffmann-Riem, H., & Krohn, W. (2005). *Realexperimente: Ökologische Gestaltungsprozesse in der Wissensgesellschaft*. Bielefeld: transcript-Verlag.

Hannigan, J. A. (2006). *Environmental sociology* (2. ed). London: Routledge.

Holling, C. S. (1978). *Adaptive Environmental Assessment and Management*. Chichester: Wiley.

Holling, C.S. and Walters C.J. (1990).Large-scale management experiments and learning by doing. *Ecology*, 71, 2060-2068.

Imperial Oil's Kearl website. Retrieved August 16, 2008 from the World Wide Web: < http://www.imperialoil.ca/Canada-English/ThisIs/Operations/TI_O_Kearl_facilities.asp>.

Jamison, A. (1996). The Shaping of the Global Environmental Agenda: The role of Non-Governmental Organisations. In S. Lash, B. Szerszynski, & B. Wynne (Eds.). *Risk, environment and modernity. Towards a new ecology.* (pp. 224-245) London: Sage.

Jasanoff, S. (2001). Images and imagination: The Formation of global environmental consciousness. In Miller, C. A. and Edwards, P. N. (Eds.) *Changing the atmosphere. Expert knowledge and environmental governance.* (pp.309-337) Cambridge, Mass: MIT Press.

Kahneman, D and Tversky, A. (1982). Variants of Uncertainty. *Cognition,* 11, 143-157.

Kasperson, R.E. (1992). The Social Amplification of Risk:Progress in Developing an Integrative Framework. in: Sheldon Krimsky, Dominic Golding (Eds), *Social Theories of Risk*. (pp.153-178) Westport: Praeger

Klassen, H. 1999. *A Business History of Alberta*. University of Calgary Press

Kriebel, D.; Tickner, J.; Epstein, P.; Lemons, J.; Levins, R.; Loechler, E.L.; Quinn, M.; Rudel, R.; Schettler, T. and Stoto, M. (2001). The Precautionary Principle in Environmental Science. *Environmental Health Perspectives*, 109, 871-876.

Krimsky, S., & Golding, D. (Eds.). (1992). *Social theories of risk*. Westport: Praeger

Krohn, W., & Krücken, G. (Eds.). (1993). *Riskante Technologien: Reflexion und Regulation ; Einführung in die sozialwissenschaftliche Risikoforschung*. Frankfurt am Main: Suhrkamp

Kunreuther, H. and Slovic, P. (1996). Science, Values and Risk. *Annals of the American Academy of Political and Social Science*, 545, 116-125.

Latour, B. (1988). *Science in Action: How to follow Scientists and Engineers through Society.* Harvard University Press.

Leech, B. L. (2002). Asking Questions: Techniques for Semistructured Interviews. *PS: Political Science & Politics*, 35, 665-668.

Mardsen, W. (2007). *Stupid to the Last Drop: How Alberta Is Bringing Environmental Armageddon to Canada (And Doesn't Seem to Care)*. Toronto: Knopf.

Marshall, A. (2004). Activist's Odyssey Far From Finished. *Wild Lands Advocate*, 12, 7 – 8. Retrieved August 9, 2008 from the World Wide Web: <http://events.albertawilderness.ca/Awards/AR0406MK.pdf>.

Martin, B. and Richards, E. (1995). Scientific knowledge, controversy, and public decision-making.In Sheila Jasanoff, Gerald E. Markle, James C. Petersen, and Trevor Pinch (Eds.), *Handbook of Science and Technology Studies. (*pp. 506-526) Newbury Park, CA: Sage

McDaniels, T., Axelrod, L.J. and Slovic, P. (1995). Characterizing Perception of Ecological Risk. *Risk Analysis*. 15, 575-588.

McLain, R. J., & Lee, R. G. (1996). Adaptive Management: Promises and Pitfalls. *Environmental Management*, 20, 437–448.

Northern River Basin Study website. Retrieved January 21, 2008 from the World Wide Web: < http://www3.gov.ab.ca/env/water/nrbs/index.html>

O'Riordan, T. (2001). *Reinterpreting the precautionary principle*. London: Cameron May.

Pembina Institute History. Retrieved August 8, 2008 from the World Wide Web: <http://www.pembina.org/about/history>.

Perrow, C. (1984). *Normal accidents. Living with high-risk technologies*. New York, NY: Basic Books.

Peterson, M. (2007). The precautionary principle should not be used as a basis for decision-making. *EMBO reports*, 8, 305-308.

Ravetz, J. R. (1986). Usable Knowledge, Usable Ignorance. In W. C. Clark & R. E. Munn (Eds.), *Sustainable development of the biosphere.* (pp. 415–432). Cambridge: Cambridge University Press.

Renn, O. (2007). Precaution and analysis: two sides of the same coin? *EMBO Reports*. 8, 303-304.

Renn, O. (1992). Concepts of Risk: a classification. In: Sheldon Krimsky, Dominic Golding (Eds), *Social Theories of Risk.* (pp. 53-79). Westport: Praeger.

Resnik, D.B. (2003). Is the precautionary principle unscientific? *Studies in History and Philosophy of Biological and Biomedical Sciences*, 34, 329-344.

Sandin, P., Peterson, M., Hansson, S.O., Rudén, C. and Juthe, A (2002). Five charges against the precautionary principle. *Journal of Risk Research.* 5, 287 – 299.

Schindler, D. W. and Donahue, W. F. (2006). An impending water crisis in Canada's western prairie provinces. *PNAS*, 103, 7210-7216. Retrieved January 21, 2008 from the World Wide Web: http://www.pnas.org/cgi/content/full/103/19/7210

Sierra Club of Canada website, History. Retrieved August 9, 2008 from the World Wide Web: <http://www.sierraclub.ca/national/aboutus/history.html>.

Simon Fraser University think-tank. (2002). *Water and the future of life on earth.* Patricia Gallaugher and Laurie Wood (Eds) an edited proceedings from the workshop and think tank, May 22-24, 2002 Presented by Continuing Studies in Science, Simon Fraser University and the Liu Centre for the Study of Global issues, University of British Columbia. Retrieved January 21, 2008 from the World Wide Web: <http://www.sfu.ca/cstudies/science/water/pdf/Water.pdf>.

Slovic, P., Fischhoff, B. and Lichtenstein, S. (1979). Rating the Risk. *Environment*, 21, 14-39.

Slovic. P. (1992). Perception of Risk: Reflections on the Psychometric Paradigm. In: Sheldon Krimsky, Dominic Golding (Eds), *Social Theories of Risk*. (pp. 117-152). Westport: Praeger.

Smithson, M. (1989). *Ignorance and Uncertainty. Emerging Paradigms*. New York, Berlin, etc.: Springer.

Smithson, M. (1993). Ignorance and Science. *Knowledge: creation, diffusion, utilisation,* 15, 133-156.

Spaling, H., Zwier, J., Ross, W. and Creasey, R. (2000). Managing Regional Cumulative Effects of Oil Sands Development in Alberta, Canada. *Journal of Environmental Assessment Policy and Management*, 2, 501–528.

Stirling, A. (2007). Risk, precaution and science: towards a more constructive policy debate. *EMBO Reports*, 8, 309-315.

Stocking, S. Holly, & Holstein, L. W. (1993). Constructing and Reconstructing Scientific Ignorance: Ignorance Claims in Science and Journalism. *Knowledge: Creation, Diffusion, Utilization*, 15, 186–210.

Sunstein, C.R. (2003). Beyond the Precautionary Principle. *University of Pennsylvania Law Review*, 151, 1003-1058.

The Story of Imperial Oil. Retrieved August 8, 2008 from the World Wide Web: <http://www.imperialoil.ca/Canada-English/ThisIs/Story/TI_S_StoryOfIOL.asp>.

Tierney, K.J. (1999). Towards a critical Sociology of Risk. *Sociological Forum*, 14, 215-242.

Tonkiss, F. (2004). Analysing text and speech: content and discourse analysis .in Seale, C. (Eds). *Researching Society and Culture*. (pp.367-382). Sage Publications

Toxic Watch Society of Alberta History. Retrieved August 8, 2008 from the World Wide Web: <http://www.toxwatch.ca/node/3>.

Tversky, A. and Kahneman, D. (1973).Availability: A heuristic for judging frequency and probability. *Cognitive Psychology*, 4, 207-232.

van Asselt, M.B.A. and Vos, E. (2006). The Precautionary Principle and the Uncertainty Paradox. *Journal of Risk Research*, 9, 313–336.

Walters, Carl (1986). *Adaptive Management of Renewable Resources*. New York: Macmillan

Wehling, P. (2006). *Im Schatten des Wissens?: Perspektiven der Soziologie des Nichtwissens*. Konstanz: UVK-Verlag.

Weinberg, A.M. (1985). Science and its limits: the regulator's dilemma. *Issues in Science and Technology*, 2, 59–72.

Wynne, B. (1992). Uncertainty and environmental learning Reconceiving science and policy in the preventive paradigm. *Global Environmental Change*, June 1992.

Appendix A- Main documents for analysis from the CEAA Registry website

Date	Document	Author(s)	Recipient(s)
November 7, 2003	Public Notice – Proposed Revised Terms of Reference	Imperial Oil	DFO
November 18, 2003	Canadian Environmental Assessment Act: Federal Coordination Regulations Referral	The Agency	DFO
December 22, 2003	Invitation to participate in a cooperative environmental assessment review of the project	The Agency	AENV
December 22, 2003	Responsible authority determination	The Agency	Imperial Oil
January 7, 2004	Federal environmental assessment and the Responsible Authority	DFO	Imperial Oil
April 22, 2004	Final Terms of Reference	AENV	Kearl Oil Sands development[13]
July 1, 2005	Environmental Impact Assessment	Imperial Oil	AENV
October 31, 2005	Statement of Concerns	OSEC	AENV, EUB of Alberta
November 23, 2005	Preliminary discussion with Imperial Oil	Imperial Oil	DFO
June 1, 2006	Kearl Oil Sands Project - Mine Development - Draft No Net Loss Plan Report	Imperial Oil	DFO
June 1, 2006	Supplemental Information Request no.2	AENV	Imperial Oil
June 9, 2006	Additional Supplemental Information	Imperial Oil	Alberta Environment, Alberta Energy and Utilities Board
July 14, 2006	Notice of Referral to a Review Panel	The Agency	N/A
July 14, 2006	Agreement to Establish a Joint Panel	The Agency /AEUB	N/A
July 25, 2006	Supplemental Information Request no.3	Alberta Environment	Imperial Oil

[13] All the parties (industrial and governmental) involved in the initial parts of the environmental assessment.

Date	Document	Author(s)	Recipient(s)
August 6, 2006	SIR Round 3 - Health Team Clarification Questions on Additional Supplemental Information	Imperial Oil	Alberta Environment
August 6, 2006	Responses to OSEC Statement of Concern	Imperial Oil	OSEC
August 10, 2006	News Release - Federal Government Awards Participant Funding	The Agency	N/A
September 26, 2006	Supplemental Information Request no.4	Alberta Environment	Imperial Oil
October 1, 2006	Federal department submissions	Government of Canada	Joint Review Panel
October 6, 2006	AHW Clarification Questions And Responses	Imperial Oil	Alberta Health and Wellness
October 6, 2006	Letter confirming EIA report is complete	Alberta Environment	Alberta Energy and Utilities Board
October 6, 2006	Government of Alberta Submission	Alberta Justice	Alberta Energy and Utilities Board
October 12, 2006	OSEC Submission	Oil Sands Environmental Coalition	Alberta Energy and Utilities Board
November 15, 2006	Imperial Oil Statement Clarification for AEUB (002-030)	Imperial Oil	N/A
November 16, 2006	Imperial's Proposed Water Use (008-008)	Oil Sands Environmental Coalition	N/A
February 27, 2007	Joint Panel Report	Joint Review Panel	N/A
August 1, 2007	Government of Canada's Response to the Environmental Assessment Report of the Joint Review Panel on the Kearl Oil Sands Project	DFO	N/A
May 6, 2008	Joint Panel Report (Rationale)	Joint Review Panel	N/A
June 6, 2008	Decision	Fisheries and Oceans Canada	N/A

Appendix B- List of interviews and exchanges

Date	Person contacted	Form of the exchange	Content of the exchange
June 6, 2008	Federal representative for the KOS project environmental assessment	1-hour phone call carried in French following initial email contact.	General information on environmental assessment in Canada. No information on KOS project available and decision-making under uncertainty.
June 25, 2008	High representative for the Sierra Club of Canada	1-hour face-to-face interview carried in English in Ottawa following initial email contact.	General and specific information regarding the KOS case, environmental assessment in Canada and decision-making under uncertainty.
July 10, 2008	Recognised investigative journalist and book author on the oil sands	1-hour and a half face-to-face interview carried in English in Montreal following initial email contact.	General and specific information regarding environmental problems created by the oil sands industry, general and specific information regarding industry-government dynamics and opinion information on decision-making under uncertainty.
Between May 30, 2008 and July 15, 2008	Representative for decisional governmental body	Several email exchanges in English.	General information regarding risk and uncertainty management.
Between May 30 and June 30, 2008	Representative for Albertan environmental grassroots organization	Unanswered emails and phone calls.	
Between May 30 and June 30, 2008	Representative for oil company	Unanswered emails and phone calls.	

Appendix C: Excerpt from OSEC's official submission to the Joint Panel

> "Under the heading "Marginal GHG increments" the proponent identifies that at full operations the Kearl Project will contribute 0.51 % and 1.7% of the most recently reported national and provincial GHG emissions (2002 data). (Volume 5 – Page 2-166). Imperial indicates that the GHG intensity for the project will range from approximately 38 to 44 kg ECO2/bbl bitumen (Volume 5 – Page 2-167). Imperial then notes that this intensity *"…is in the range of intensities specified in approvals for other developments in the oil sands region,"* and presents Table 2-72 ((Volume 5 – Page 2-167).

Unfortunately this comparison is not particularly relevant and does not provide a useful analysis of Imperial's performance relative to its peers. Comparing the Kearl Project to *in situ* SAGD projects (Devon Jackfish and OPTI/Nexen Long Lake) is not a useful comparison given that these projects employ fundamentally different approaches to bitumen extraction. Similarly, Imperial fails to note that the apparently high GHG intensity provided for Canadian Natural's Horizon Project arises from the fact that this project will include an upgrader that will process bitumen into synthetic crude oil. It is more meaningful to compare the Kearl Project's GHG intensity with that of their oil sands mining peers. For example, Petro-Canada/UTS's Amendment Application for the Fort Hills Project notes that its GHG intensity will be 32.85 kg/barrel (Application for Amendment 2002, pg. 6-6, March 2005). Therefore, when comparing the Kearl Project's GHG intensity with that of the Shell Jackpine Mine – Phase 1 project or the PetroCanada/UTS Fort Hills Oil Sands Mine one finds that is considerably higher (atleast 7 kg/barrel)." (p.13-14)