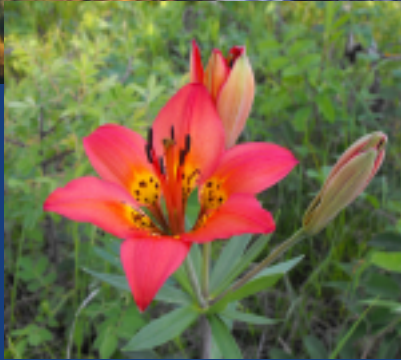


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PREVENTING OIL SANDS FEVER
IN SASKATCHEWAN



PETER PREBBLE • ANN COXWORTH • TERRA SIMIERITSCH
SIMON DYER • MARC HUOT • HELENE WALSH

August 2009

Oil
SANDS
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SERIES

the PEMBINA
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Sustainable Energy Solutions



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CANADIAN PARKS AND WILDERNESS SOCIETY

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Institute (www.pembina.org), the Saskatchewan Environmental Society
(www.environmentalsociety.ca) and the Canadian Parks and Wilderness Society
(www.cpaws.org).

About the Pembina Institute

The Pembina Institute is a national non-profit think tank that advances sustainable energy solutions through research, education, consulting and advocacy. It promotes environmental, social and economic sustainability in the public interest by developing practical solutions for communities, individuals, governments and businesses. The Pembina Institute provides policy research leadership and



Sustainable Energy Solutions

education on climate change, energy issues, green economics, energy efficiency and conservation, renewable energy, and environmental governance. For more information about the Pembina Institute, visit www.pembina.org or contact info@pembina.org.

About the Saskatchewan Environmental Society

The Saskatchewan Environmental Society is a non-profit, registered charity whose mandate is to work towards a world in which all needs can be met in sustainable ways. Sustainability will require healthy ecosystems, healthy livelihoods and healthy human communities. SES has been active in Saskatchewan since 1970. We have worked on such issues as energy production and conservation, climate change, nuclear power, toxic substances, agriculture, mining, forests and water. We follow



developing environmental issues and press for responsible action at the local, provincial, national and international levels. Our activities include information provision, policy development and practical projects that demonstrate the viability of sustainable solutions. More information about SES is available on our website at www.environmentalsociety.ca.

About the Canadian Parks and Wilderness Society

The Canadian Parks and Wilderness Society's goal is to protect at least 50% of Canada's wilderness. We serve as a voice for individuals who value and are concerned about the maintenance of biodiversity and wilderness in Canada. Our conservation programs are delivered by an experienced and dedicated team of staff and volunteers. We work with land managers, including



government, industrial tenure holders and Aboriginal Peoples, to advance conservation solutions. Our niche is in supplying locally grounded technical expertise in conservation planning and in building the alliances and public support needed for successful implementation of these plans. More information about CPAWS is available at www.cpaws.org.

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Executive Summary

Saskatchewan Oil Sands Impacts Large and Growing

The existence of substantial oil sands reserves in Saskatchewan remains largely unknown to the general public, despite the international attention received by Alberta's oil sands. The production of bitumen, the tar-like substance that can be extracted from oil sands, is not yet underway in Saskatchewan, but there is significant commercial and government interest in developing the resource. Lands have been leased and exploration and development is proceeding. An estimated 27,000 square kilometres of northwestern Saskatchewan — almost 5% of the province — has some level of oil sands potential. An independent estimate puts the size of the oil sands resource in Saskatchewan at as much as 2.3 billion barrels of bitumen.

PHOTO: DAVID DODGE, THE PEMBINA INSTITUTE



▲ *In Alberta, in situ oil sands projects have had major impacts on the landscape.*

The people of Saskatchewan should be consulted on whether or not they support oil sands development while it is still in its infancy. If they do, Saskatchewan has the opportunity to chart a new course for development of the oil sands — one based on responsible management with a regulatory framework that protects the

environment, respects the interests of Aboriginal People and optimizes benefits for all residents of Saskatchewan.

Alberta represents a cautionary example of how mismanagement of oil sands development can have significant environmental and social impacts. In Alberta, feverish oil sands expansion outpaced environmental management, and the Governments of Alberta and Canada are still struggling to catch up. Their failure to adequately plan for and regulate oil sands development is responsible for the negative attention that the oil sands are receiving in Alberta, nationally and internationally.

Saskatchewan has the opportunity to learn from its western neighbour to ensure that if oil sands development does occur, it proceeds responsibly. Instead, Saskatchewan seems poised to repeat many of the same, preventable mistakes that have damaged the environment in Alberta and raised both local and international opposition to oil sands development.

This report argues that Saskatchewan is poorly equipped to ensure oil sands development will proceed responsibly and that it has not developed the environmental management and monitoring systems that are essential for responsible oil sands development. Nor, as was the case in Alberta, has it adequately consulted the public about the expectations for oil sands development, or even if the benefits of oil sands development outweigh the costs to the people of Saskatchewan.

This report documents the significant risks that come with oil sands development:

- the loss of sensitive and irreplaceable lands that deserve protection
- the fragmentation of the boreal forest from oil sands development
- the loss of biodiversity in the boreal forest

- the acidification of lakes, rivers and streams in northern Saskatchewan
- the risk of groundwater and surface water contamination with toxic wastes
- the release of significant greenhouse gas emissions, which are driving dangerous climate change

Although exploration and development of oil sands resources in Saskatchewan is at an early stage, Saskatchewan is already being affected by oil sands development in Alberta. Up to 70% of the sulphur dioxide and nitrogen oxides emitted by the Alberta oil sands are deposited over Saskatchewan. These pollutants contribute to acid rain, which places northern Saskatchewan's lakes and forests at risk.

While oil sands activity offers short-term job and revenue benefits, the economic and environmental losses associated with the above-mentioned risks may prove very high indeed.



PHOTO: HELENE WALSH

▲ *Acid rain kills fish and puts Saskatchewan's world-class lakes and forests at risk.*

Saskatchewan is at a cross-roads. Given the demonstrated risks and impacts associated with oil sands development, it is essential that the Government of Saskatchewan hold public consultations to fully debate the costs and benefits of oil sands development and to decide whether and how oil sands development should proceed. If this consultation concludes that oil sands development is sought by the people of Saskatchewan, we recommend a necessary pause on new oil sands lease sales and development approvals for at least five years. This pause would give Saskatchewan time to put in place a set of prerequisite conditions to minimize environmental damage and optimize economic benefits for the people of Saskatchewan — most particularly the people of northern Saskatchewan.

These recommendations include the following:

1. Complete a comprehensive regional environmental assessment of northwestern Saskatchewan and develop a regional land-use plan.
2. Ensure full consultation with First Nations and Métis peoples.
3. Complete Saskatchewan's protected areas network in northwestern Saskatchewan.
4. Set greenhouse gas regulations that achieve absolute reductions.
5. Require the use of best available technology to minimize acidifying emissions.
6. Develop an adequate monitoring system for water resources.
7. Develop an adequate monitoring system for biodiversity.
8. Develop a royalty regime that maximizes benefits for the people of Saskatchewan.

Saskatchewan can choose whether it will be an oil sands carbon copy of Alberta or chart a different path with a thoughtful approach to resource development.

Forewords

Don Deranger

The future of the residents of northern Saskatchewan is directly linked to the health of our children, the health of our land and the health of our surface and underground waters.



The prospect of oil sands is a two-edged sword. It will offer jobs and business opportunities, but if developed too quickly or without proper regulation it can destroy our lands and water supplies. I do not want to see a carbon copy of Alberta's rapid and destructive approach to in situ oil sands development unfolding in northern Saskatchewan.

In the months and years ahead, First Nations people and the Métis people of this province will make their own decisions about their position on oil sands development, and we will work hard to ensure our voices are heard by the federal and provincial governments.

This publication will be a valuable resource to all residents of northern Saskatchewan. It is an educational tool that we can use to become more aware of the issues and to understand the negative environmental impacts that often come

with oil sands.

I endorse the report's call for a Regional Land Use Plan and for a full study of our underground aquifers in northwestern Saskatchewan. I also recommend a federal-provincial panel be developed to give communities a venue for gathering information, expressing concerns and providing recommendations on oil sands development.

I share the authors' concern about the risk of acid rain from oil sands development. Their research highlights that thousands of tonnes of acidic emissions from Alberta oil sands are already entering northern Saskatchewan and falling on our lakes and forests each year. It is time for governments to properly regulate these pollutants.

I urge all residents of northern Saskatchewan to read this report and use the information in it to help protect the well-being of our communities, our land and our water resources.

Don Deranger is a Vice Chief of the Prince Albert Grand Council and a powerful advocate for environmentally sustainable development in northern Saskatchewan. He endorses this work on behalf of the Denesuline Nations of Saskatchewan.

Lorne Scott

The oil sands of Alberta have left behind a disturbing legacy of scarred landscapes, diminished wildlife, polluted waters, and escalating downstream impacts. There have been benefits too — jobs and revenue for provincial coffers. However, the costs to the next generation of Albertans have been high indeed. Clearly, oil sands production takes a much greater toll on the natural



environment than conventional oil production does.

Some of the environmental damage is inherent in the nature of oil sands. Extracting the molasses-like bitumen out of the ground is an energy and water intensive business. Yet so much of the damage has been driven by the failure of the Government of Alberta and the Government of Canada to properly regulate the oil sands industry.

In this carefully referenced and well-written report, the Saskatchewan

Environmental Society, the Pembina Institute and the Canadian Parks and Wilderness Society combine their expertise to carefully document the environmental impact of oil sands in Alberta. More importantly, they warn the people of Saskatchewan that they will have to work diligently to ensure their government does not duplicate Alberta's irreversible mistakes.

As the prospect of oil sands in Saskatchewan looms large, so does the responsibility of the people of Saskatchewan to take a different approach to oil sands development — one that is characterized by wise stewardship and concern for the long-term well-being of our province. To start this process, the benefits and disadvantages

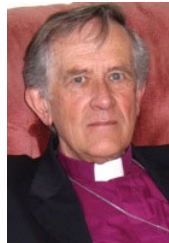
of oil sands development must be a topic of public discussion, as must the mechanisms by which the industry might be effectively regulated, should development proceed.

By laying out a set of public policy requirements that should be in place before oil sands extraction is allowed, this report has given the people of Saskatchewan much to consider as they and their government build a public policy on oil sands.

Lorne Scott's commitment to environmental conservation spans five decades. He is a former Saskatchewan Environment Minister and remains active in many conservation organizations. He is a recipient of the Order of Canada. His endorsement of this work is a personal one.

Tom Morgan

In May 2009 I joined a group of church leaders on a visit to the oil sands at Fort McMurray. We met with political leaders. We met with leaders from the oil industry, with native leaders and elders, and with local citizens.



We left with an overwhelming sense of the enormity of it all. It is our future. We are all participants in energy consumption, and we all long to find a responsible way forward in the face of global demand for ongoing sources of energy.

The overriding concern that haunted me as we left Fort McMurray was that we are moving too fast, that we are giving insufficient time for due diligence.

Today we are already working on what could well be the last great oil field. Talk at Fort McMurray is of ever-growing production. But only now are we seeking to reconcile conflicting reports about the health of the water in the rivers.

Fort Chipewyan has raised as-yet

unanswered concerns about rare forms of cancer in their community. We know very little about contaminants that could be entering underground aquifers. The list of unanswered questions continues to grow.

There is time. The oil sands will not go away, and the economic slowdown has lessened the pace. Saskatchewan has been given time to build on the experiences of Alberta and to learn from those experiences. There is time for cumulative environmental impact studies. There is time to engage the citizens of Saskatchewan in consultation.

This report provides a point of entry into the decision-making discussions we must have. It is my hope that the report will be widely distributed. I pray that we in Saskatchewan will take the time we need to find a way forward which will make our children proud of the decisions we make.

The Right Rev. Thomas O. Morgan is the retired Anglican Archbishop of Saskatoon. He is presently serving on the board of directors of the Anglican Church of Canada's Primate's World Relief and Development Fund.

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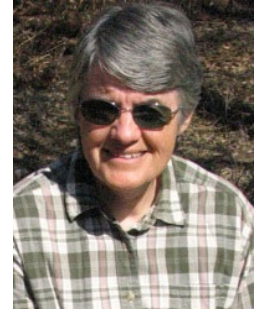
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Helene holds a Master of Science in Zoology from the University of Alberta. She has been involved with boreal forestry issues since 1998, including participation in the development of the Forest Stewardship Council (FSC) National Boreal Standard. Helene currently serves as Boreal Campaign Director for CPAWS Northern Alberta Chapter. Since 2005 Helene has been involved with oil sands issues as a member of the Cumulative Environmental Management Association (CEMA) and its work to recommend the establishment of protected areas in northeastern Alberta. Helene is also active with Keepers of the Athabasca and their involvement with Saskatchewan issues, especially those that arise from oil sands development in Alberta.



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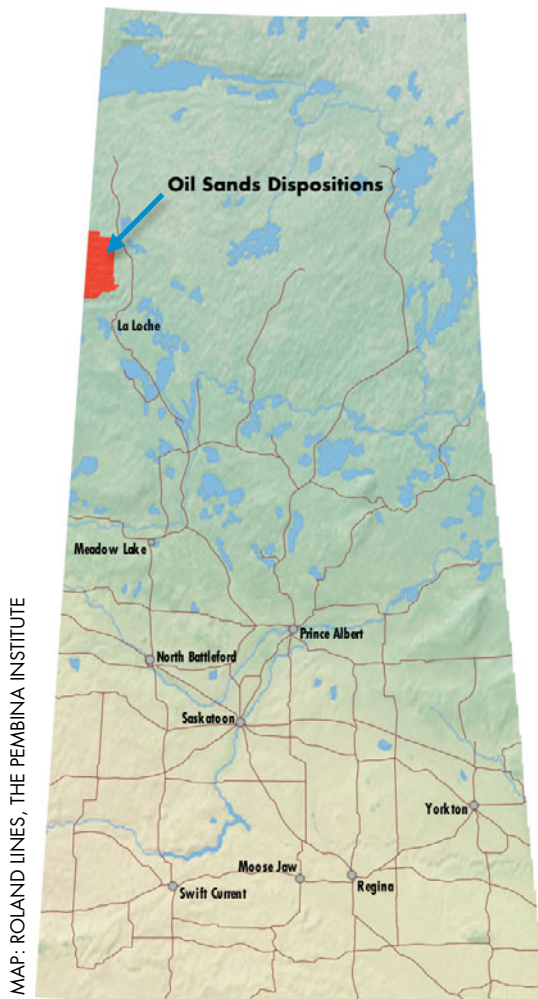




PHOTO: CHURCHILL RIVER CANOE OUTFITTERS

▲Figure 1. Clearwater River Provincial Park borders the southern limit of Oilsands Quest's land holdings.

Saskatchewan's Oil Sands



▲Figure 2. The Government of Saskatchewan has granted almost 260,000 hectares for oil sands development.

1.1. Global and Provincial Context

The global demand for oil is high. In 2008 alone, humans consumed over 85 million barrels of oil each day.¹ With the recent economic slowdown, the demand for oil from the United States and other countries has been relatively flat, if not declining.² While studies suggest that it is too early to predict whether or not oil demand will return to a

state of growth in the United States,³ the world's demand for energy is projected to increase over the next several years.⁴

While the global demand increases, conventional supplies of oil are being depleted. Evidence suggests that worldwide peak discovery of oil occurred sometime in the 1960s and that the peak of conventional oil production is now approaching.⁵ In a fossil fuel-based economy, the fear of a potential oil shortage drives the search and development of unconventional sources, such as oil sands. While conventional oil reaches peak, oil sands are only expected to increase in the coming years. By 2008, the Canadian oil sands had grown in production to a rate of 1.2 million barrels per day,⁶ which accounted for 1.4% of global oil demand.⁷ In situ operations produced 43% of this amount.⁸ Even with an economic slowdown, oil sands production is expected to increase to 2.2 million barrels per day by 2015 and to 4.3 million barrels per day by 2030.⁹

Given the risk of declining oil reserves, the oil sands could be a valuable energy source for a country such as Canada that relies heavily on large volumes of liquid transportation fuels. However, much of the synthetic crude from Alberta's oil sands is not being used by Canadians. Canada, which exports nearly 1.8 million barrels of oil to the United States each day, is the largest source of oil entering the United States.¹⁰ Roughly 780,000 of those exported barrels are synthetic crude oil. In total, 64% of all oil sands products end up in the United States.¹¹

In recent years it has become clear that the Government of Saskatchewan wishes to pursue development of the province's oil sands resources. However, there has not been an open or transparent discussion with the citizens of Saskatchewan regarding both whether and how to pursue this

development. In essence, Saskatchewan has been following the same path taken by the Government of Alberta. It is a path that has led to growing public concern about the environmental, social and economic impacts of oil sands development.

An effective approach to considering oil sands development requires political will, public consultation, clear planning and regulations, effective federal-provincial cooperation and rigorous enforcement of environmental laws to protect the interests of the people of Saskatchewan. In the absence of these conditions, as has been the case in Alberta, the effects of oil sands development will grow rapidly and create significant environmental and economic challenges.

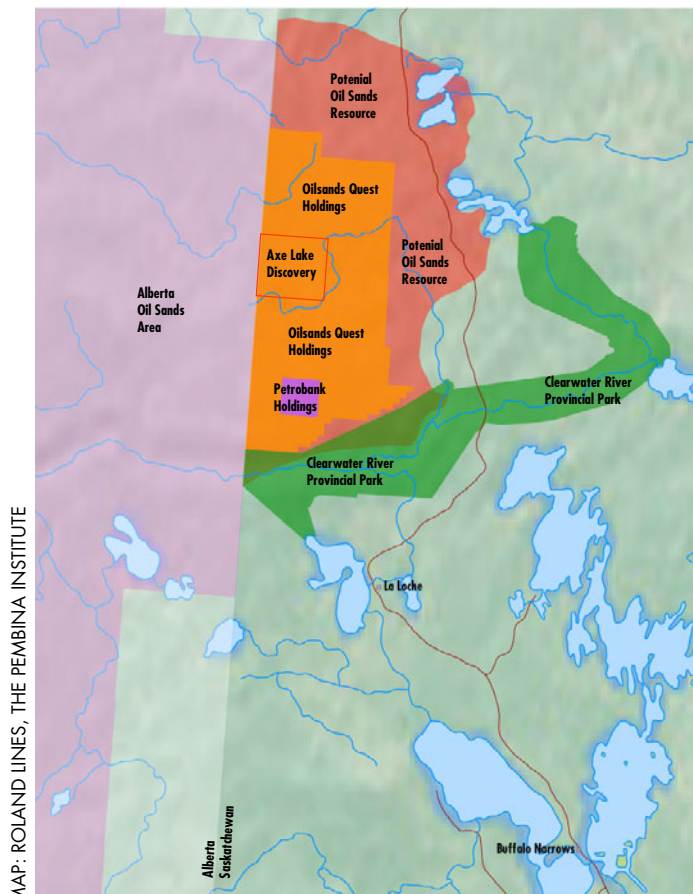
development, the past two Saskatchewan governments have granted oil sands dispositions and permitted exploration over a significant area of Saskatchewan's boreal forest prior to completing a regional environmental assessment.

1.2. Location and Scale

An estimated 27,000 square kilometres of northwestern Saskatchewan has some level of oil sands potential. This area covers almost 5% of Saskatchewan, or an area larger than Lake Erie.¹² The deposit lies 185 metres below the surface¹³ and is reported to be up to 27 metres thick. It is located in what is called the McMurray Formation, which also extends into Alberta.

The discovered resource in the Axe Lake Discovery area covers approximately 10,619 hectares in Saskatchewan, approximately 115 kilometres northeast of Fort McMurray. The area in which Oilsands Quest holds permits abuts the Clearwater Wilderness Park, which is well used by outdoor enthusiasts from Saskatchewan and around the world. It includes watersheds of the Clearwater River and three smaller rivers, the Richardson, Deschermé and Firebag. The closest communities are La Loche and Deschermé Lake.

An independent estimate of the size of the oil sands resource suggests there is as much as 2.3 billion barrels of bitumen in place in Saskatchewan.¹⁴ Oilsands Quest have claimed that their company's holdings along the northern Alberta/Saskatchewan border could hold 6.5 billion barrels, mostly on the Saskatchewan side of the border, and that the Axe Lake find could bring in "perhaps 100,000 barrels per day for perhaps 30 or more years."¹⁵ A major part of this discrepancy most likely lies in the bitumen resources that have been proven to exist as opposed to those that are estimated to exist at this time. Only a small fraction of the permit area has been explored so far.



▲ Figure 3. Oilsands Quest's Axe Lake Discovery lies along the Alberta border.

The Government of Saskatchewan is off to a shaky start in its regulatory role. For example, in a desire to accelerate oil sands

1.3. Oil Sands History

1.3.1. Beginnings

Professor Walter Kupsch of the University of Saskatchewan's Department of Geology is credited with first reporting the occurrence of large blocks of oil sands deposited in the glacial till near Peter Pond Lake in 1954. It was not until the early 1970s that Robert Gies, a geologist working for Shell, followed up on Kupsch's report and encountered a local Aboriginal resident who had excavated a "huge pile of tar sand" as he was building the foundation for a house. Shell promptly leased about 800,000 hectares along both sides of the border.¹⁶ At that time development was regulated under the 1964 Oil Shale Regulations.¹⁷

Other companies soon followed suit, and in 1972 a total of about 1.3 million hectares was leased to Shell, Hudson's Bay Oil and Gas, Gulf Oil Canada, Hewitt Oil, Roughbank Petroleum and Surf Exploration. Exploration resulted in discouraging prospects, and all of these leases and permits were surrendered by the end of the 1970s.¹⁸ Things lay quiet for nearly three decades.

1.3.2. Recent History

In June 2004 Powermax Energy acquired approximately 570,000 hectares in "oil shale" permits north of the Clearwater River along the Saskatchewan-Alberta border to explore for oil sands. Oilsands Quest subsequently acquired these permits, and then relinquished 40% of them, which left them holding 342,000 hectares in June 2005. At that time, a Crown reserve was created and designated as the "oil sands administrative area."

In the spring of 2006 Oilsands Quest completed a phase 1 drilling program in an area 50 kilometres east of Suncor's Firebag operation in northeastern Alberta. It claimed to have found bitumen up to 18% grade.¹⁹

In May 2007 the Saskatchewan

Government issued updated oil sands regulations intended "to deal with land tenure policies and to ensure that Saskatchewan's regulatory framework is competitive with Alberta."²⁰ Pre-existing oil shale dispositions were grandfathered and continued to be administered under the Oil Shale Regulations.

August 2007 saw the first public offering of Crown oil sands rights under a competitive bid system. Almost \$3.3 million was raised in the sale of six exploration licences to two brokers. Oilsands Quest acquired five of these, encompassing 44,000 hectares for \$2.2 million, while Petrobank got the remaining lease (9,000 hectares) for just over \$1 million.

In early 2008 the Saskatchewan Environmental Society called on the province's Minister of Environment to undertake a strategic regional environmental assessment of the watersheds of the Clearwater, Deschambeau, Firebag and Richardson Rivers in northwestern Saskatchewan before any further permits were issued for exploratory drilling or seismic work related to oil sands development.²¹

Both Oilsands Quest and the Ministry of Environment claim that the company has contracted a baseline ecological study of their permit area. However, despite several requests, this study is not publicly accessible. Exploration work, including the construction of two camps accommodating hundreds of workers, an airstrip, roads, hundreds of wells and over 1,000 kilometres of seismic line cutting, has taken place prior to completion of an accessible baseline study or environmental assessment.²²

1.3.3. Current Lease Holdings

Oilsands Quest is the company currently leading development of the Saskatchewan oil sands. In January 2008 it reported land holdings totalling 250,096 hectares in northwestern Saskatchewan, mostly in the form of exploratory permits.

Oilsands Quest has explored only a small percentage of its holdings in the Axe Lake Discovery area using two-dimensional seismic exploration. It followed up with three-dimensional seismic exploration in the more promising areas, and then drilled cores.²³ The company has conducted a baseline study of the oil sands deposit (see below), and some air quality monitoring is in place. Oilsands Quest has established economic relationships with several local communities, and it is testing extraction processes.²⁴

Oilsands Quest was quoted as saying, “As a consequence of current capital and commodity market conditions, we have undertaken an aggressive program of expenditure prioritization and control ... we have undertaken to curtail or defer some of our expenditure plans for the remainder of the fiscal year.”²⁵ The company is still conducting economic feasibility, financial planning and market studies for full commercial development, but advancement of engineering work associated with commercial development has been deferred.



▲Figure 4. Three-dimensional seismic exploration lines tend to be narrower than typical seismic lines, but they are a large source of cumulative disturbance.

Seismic Exploration

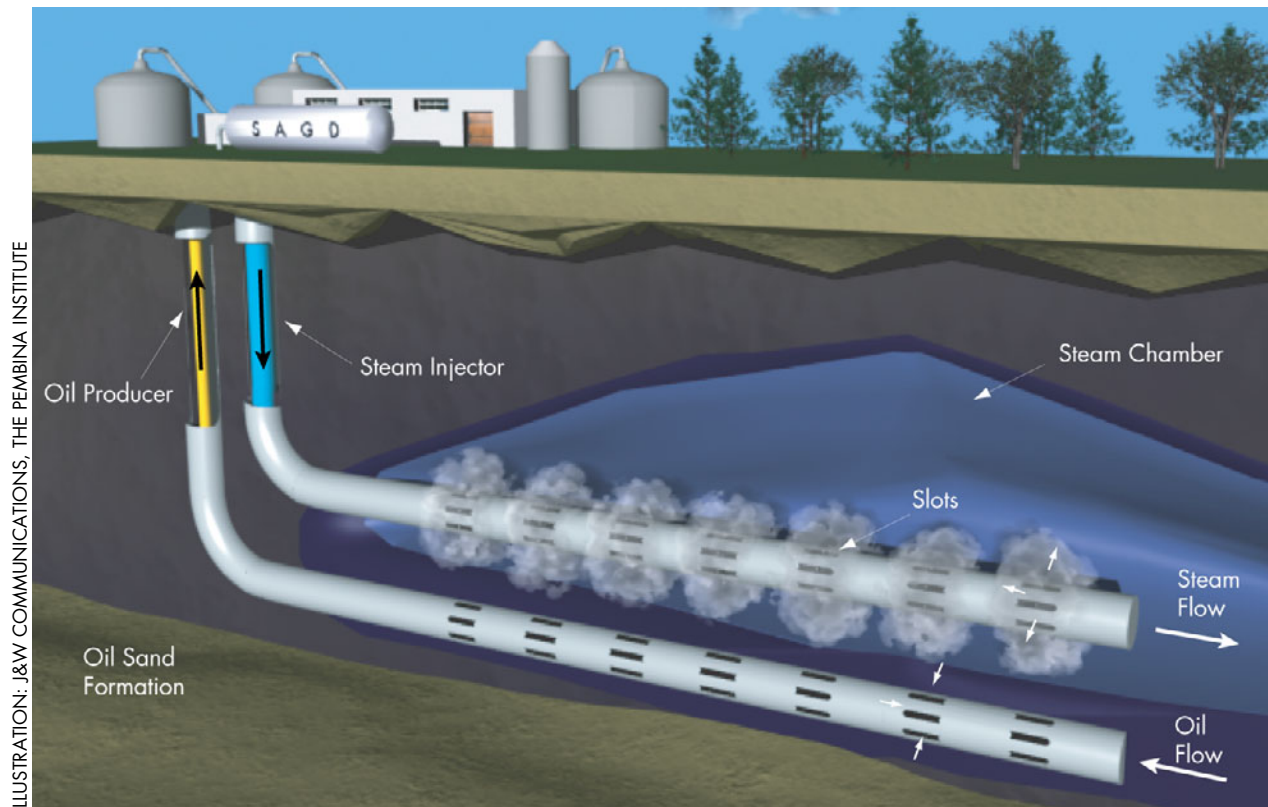
Three-dimensional seismic exploration refers to the development of a set of many closely spaced seismic lines that provide a highly detailed sampled measure of subsurface reflectivity and hence geology. Three-dimensional seismic lines provide more accurate subsurface maps than can be constructed with more widely spaced two-dimensional seismic lines.²⁶ Three-dimensional seismic lines tend to be narrower, but they are a large source of cumulative disturbance.

The other company currently active in the area is Petrobank Energy and Resources, which reported in November 2007 the acquisition of a 9,324-hectare oil sand licence in Saskatchewan with a five-year primary term.²⁷ Petrobank's holdings are surrounded by those of Oilsands Quest. Bidding for exploration permits is often carried out through brokers. The name of the broker rather than that of the client for whom the permit is purchased is what appears on the published bid information.

In the spring of 2008, five permits covering about 328,000 hectares were posted for sale. Some of the area involved is claimed as traditional land of the Buffalo River Dene. One of the bidders for all of these permits was Access Energy, three-quarters of which is owned by a First Nations company, Blacksands Petroleum.²⁸ The province announced in August 2008 that there were no successful bidders.

1.4. Oil Sands Extraction

Oil sands deposits are composed of sand, silt, clay, water and an average of about 10–12% bitumen, a thick form of crude oil.²⁹ At room temperature bitumen has a consistency that is often likened to cold molasses.³⁰ It must be heated or diluted with lighter hydrocarbons in order to flow.



▲ Figure 5. Schematic of a SAGD operation in Alberta.

Some insight into the nature of Saskatchewan's oil sands deposit has been gained by the exploratory work undertaken by Oilsands Quest, which by early 2009 had drilled 382 exploration and delineation holes and 11 developmental wells on its lease properties.³¹ The Saskatchewan oil sands deposit delineated by Oilsands Quest is approximately 20 metres thick and located at a depth of 185 metres.³² Given the depth of the oil sands deposit, it is expected that all extraction in Saskatchewan will use in situ ("in place") methods rather than open-pit mining.

1.4.1. In Situ Technologies

Steam assisted gravity drainage (SAGD) is currently the most widely used of the various in situ technologies to extract the deeper oil sands deposits in Alberta. The SAGD process involves two horizontal wells, placed near the bottom of the bitumen formation.³³ The top well is used

to inject high-pressure steam into the formation. This steam creates a steam chamber in the bitumen formation, reducing the viscosity of the bitumen to the point that it can be collected in the lower well along with the condensed water and then pumped back to the surface.³⁴

Findings to date show Saskatchewan's oil sands to be a homogenous, continuous deposit with high porosity and oil saturation, making it very comparable to oil sands deposits now being exploited in Alberta.³⁵ The primary difference with the Alberta deposits is the absence of an overlying Clearwater shale,³⁶ which means that conventional SAGD techniques used for in situ extraction in Alberta may not be suitable.

The companies that hold oil sands leases in Saskatchewan are testing several different approaches to extracting the oil from the deep bitumen deposits.^{37,38} These approaches include an experimental electro-thermal process in which an electric current is passed through the bitumen, which heats up and flows into a collector well. This approach could cost less than SAGD and

would use little water. Greenhouse gas emissions would be associated with the electricity supply if the current Saskatchewan grid were used as the source.

Tests are also being carried out by Oilsands Quest on the injection into the deposit of solvents, such as propane and butane, to reduce the viscosity of the bitumen, allowing it to flow more readily.³⁹ This method is unproven on a commercial scale.⁴⁰

Petrobank is examining underground combustion produced by injecting air into the bitumen deposit. Part of the bitumen provides the fuel for heating, and the remainder, as it warms up, flows into a collection well. This approach would require little water, but there are concerns that the underground combustion might be difficult to control. Oilsands Quest currently has test sites where some of these approaches are being evaluated as well. They claim that they have not yet decided which approach would be used in commercial development of the Saskatchewan resource.⁴¹

1.4.2. Upgrading

Once the bitumen is extracted — whether by mining or in situ techniques — it must be upgraded before it can be sent to a refinery. The upgrader converts bitumen into synthetic crude oil.⁴² This conversion can take place on site if the project includes an upgrader, or the bitumen can be piped to an external upgrading facility, such as the existing and planned facilities in “Upgrader Alley” northeast of Edmonton. In Alberta, approximately 60% of the bitumen from the oil sands is currently upgraded in the province. The remaining 40% is transported to other regions of Canada and the United States to be upgraded.⁴³

1.4.3. Environmental Context

Saskatchewan's active oil sands dispositions lie in northwestern Saskatchewan just south and west of the Precambrian Shield and immediately north of the Clearwater River Wilderness Park.

Oil sands dispositions are located in the

Lake Athabasca drainage basin and include portions of the Firebag Hills and portions of the Firebag and Deschermé River watersheds⁴⁴ (see Figure 6).

The area is at the northern tip of the Mid-Boreal Upland, which is part of the Boreal Plain Ecoregion.⁴⁵ The forest is dominated by jack pine on well-drained sites and black spruce and tamarack on wet soils and peatlands.^{46,47} Fire is a dominant natural disturbance in this part of Saskatchewan. Fire is not only destructive, but also rejuvenating in nature, because it plays a critical role in forcing change and creating new habitat. Both jack pine and black spruce are very well adapted to fire and thrive where fires are common.^{48,49}

Wildlife populations in the Mid-boreal Upland include moose, woodland caribou, white tailed deer, black bear, elk, wolf and beaver.⁵⁰ The majority of these mammals will be present in the oil sands disposition area.⁵¹ The area is also home to dozens of bird species that breed, winter or summer in or migrate through northwestern Saskatchewan.⁵²

With the exception of hunting, fishing, trapping and oil sands exploration and test drilling, the current human footprint in the oil sands disposition area is quite low. We are not aware of any forest harvesting or mining activity, and there are relatively few roads.

The Saskatchewan portion of the Clearwater River and its adjacent lands (200,000 hectares) is included in the Clearwater River Provincial Park, which was created by the Province of Saskatchewan in 1986. Thus, these lands have protected status.⁵³ However, there are additional lands next to the park that are also of high ecological value but are not protected. There are also important landscapes along northern portions of the Deschermé River that do not have protected status.⁵⁴

1.4.4. Economics and Employment

Successful oil sands development in northern Saskatchewan will be reliant on

very high oil prices. In mid-2008 oil peaked at \$147 (U.S.) per barrel before dropping below \$34 per barrel in early 2009. By June 2009 the price of oil had risen again to over \$67.⁵⁵

In southern Saskatchewan extraction from oil reserves like the Bakken formation is profitable at \$40 per barrel.⁵⁶ In contrast, oil sands development in northwestern Saskatchewan would likely require sustained oil prices of at least \$70–80 per barrel to be profitable.⁵⁷

The decline in oil prices in late 2008 and early 2009 had an immediate impact across the oil sands industry. Approximately \$100 billion in planned oil sands developments were delayed, deferred or cancelled in Alberta.⁵⁸ Oilsands Quest, with its predominantly Saskatchewan-based assets, found its shares dropping from a high of \$6.95 in June, 2008 to \$1.26 by early January 2009.⁵⁹ Its exploration camp employed up to 400 people in 2008, but that dropped to between 100 and 120 people by March 2009.⁶⁰ These fluctuations underline the tremendous volatility of the oil sands industry and the danger of economies becoming overly reliant on oil sands development as a source of job creation and government revenue.

In an attempt to obtain concrete benefits for the citizens they represent, Saskatchewan First Nations and Métis leaders have called for a share of resource royalties to be paid to Aboriginal Peoples when their traditional lands are used for mining, oil sands and other resource extraction purposes.⁶¹ To date the provincial government has rejected that request.⁶² Meanwhile, at the local level, the Northern Village of La Loche and Oilsands Quest have co-signed a memorandum of understanding that confirms the agreement between the parties to work to identify and address economic benefits, as well as the social, environmental and other impacts of Oilsands Quest exploration activities on La Loche.⁶³ The parties also agreed to make reasonable commercial efforts to negotiate a formal

exploration agreement that will deal with these matters and agreed furthermore “that the relationship and participation in a formal agreement will be available to all neighboring communities that are adjacent to and affected by Oilsands Quest’s exploration activities.”⁶⁴ Such a measure is to the credit of both parties, yet all these efforts may be insufficient to ensure the benefits of oil sands outweigh the costs. In July 2009, Oilsands Quest also signed an MOU with the Birch Narrows Dene Nation. Birch Narrows is located about 180 kilometres southwest of the Axe Lake area. Concerns over environmental impacts of resource development were cited as one of the reasons for the MOU.⁶⁵

One important warning comes from those First Nations that have experienced oil sands development directly. Earlier this year, the Athabasca Chipewyan First Nation and the Mikisew Cree First Nation took out newspaper advertisements to draw attention to their concerns about the degradation of their land, air and water from oil sands pollution. Some of their band members have obtained employment or business opportunities from oil sands development, but the perceived costs have been significant. Chief Allan Adam of the Athabasca Chipewyan First Nation said, “We are seeing disheartening toxicity levels in our animal life and have now received confirmation of unacceptable cancer rates to people in our community. As a people who have been here for thousands of years, we are sad that no one will listen and that government sits back and issues denials and publicity campaigns without substance.”⁶⁶

1.4.5. Local Communities and First Nations

The oil sands disposition area and adjacent region has a rich cultural history. It was occupied for thousands of years prior to European contact by peoples of the Taltheli tradition and by the direct ancestors of the Dene.⁶⁷ It was also inhabited for hundreds

of years by the Athabasca Cree.⁶⁸ More recently, portions of the disposition area were relatively close to important fur trade routes and to trading posts that were prominent in the 1700s, 1800s and early 1900s.⁶⁹ Both First Nations and Métis peoples played a central role in these fur trade activities, as well as pursuing traditional uses of the land. Ancient rock paintings on sections of the Clearwater River east of the oil sands dispositions attest to this region having been inhabited for thousands of years.⁷⁰ In light of the area's rich history, we anticipate there will be quite a number of archeological sites worthy of investigation and protection in the oil sands disposition area.

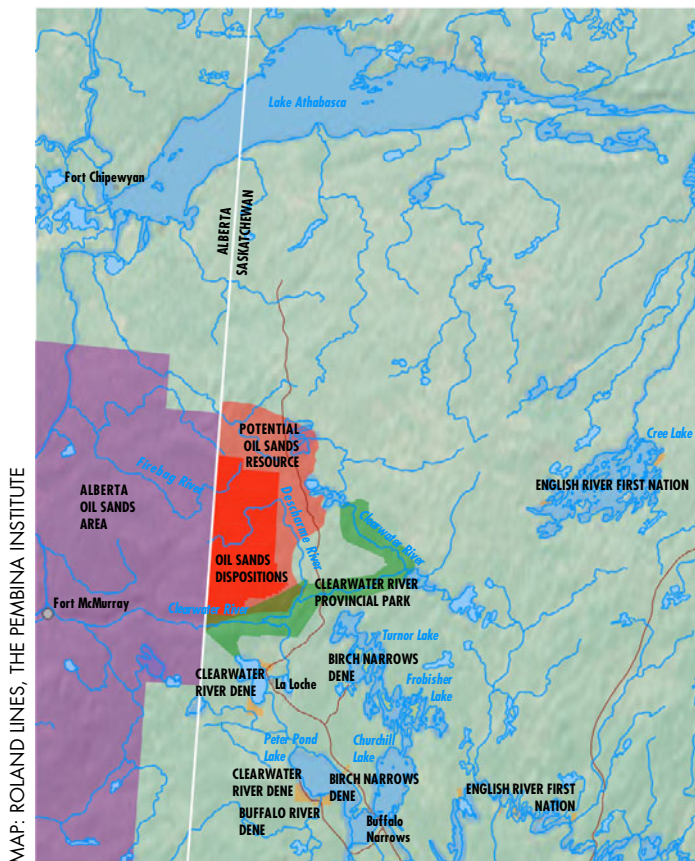
as well as English. The small Métis community of Descharme Lake is geographically closest to the oil sands exploration. It is a small hamlet of approximately 50 people known for its beautiful cross country ski trails.⁷¹

Oilsands Quest's exploration activities are currently taking place in an area approximately 70 kilometres north of the Clearwater River. It is part of a geographical region known as the Firebag Hills.

Two hours drive south of the Oilsands Quest's exploration camp and south of the Clearwater River on Highway 155 is the Northern Village of La Loche, which has a population of over 2,300.⁷² The majority of residents are of Métis and First Nations descent. La Loche is growing rapidly and has a large elementary school and high school. Unemployment is very high and there is interest in the job opportunities that oil sands development could offer.

The La Loche local of the Métis Nation considers Oilsands Quest to be on Métis traditional lands and is anxious to see a traditional land use study done.⁷³ Elders of the La Loche Métis local have identified a major ancestral transport route, which passes within a few miles of Oilsands Quest's camp. The Métis Nation of Saskatchewan is insisting on the right to be consulted about any proposals for oil sands development on traditional Métis lands.

The First Nation most affected by current oil sands exploration is the Clearwater River Dene Nation. The Clearwater River Reserve encompasses 9,511 hectares.⁷⁴ The Clearwater River Dene Nation considers the Oilsands Quest exploration area to be part of its traditional territory. It is seeking a guarantee of jobs and a share of oil wealth if an oil sands extraction facility is established. Between June 21 and July 6, 2007, the band conducted a blockade on Highway 155 to draw attention to its claims and the lack of consultation that has taken place between the province and the band council.^{75,76}



MAP: ROLAND LINES, THE PEMBINA INSTITUTE

▲ Figure 6. The oil sands dispositions are in northwestern Saskatchewan.

Northwestern Saskatchewan is a vast region primarily inhabited by Métis and First Nations peoples who speak the Dene (Chipewyan), Cree and Michif languages,

At a meeting with Western Premiers in 2008, Chief Albert Mercredi of the Fond du Lac Denesuline Nation in northern Saskatchewan described oil sands as the “most recent and greatest threat” to traditional lands.⁷⁷

Other First Nations whose members may be affected by oil sands development include the Buffalo River Dene Nation, Birch Narrows Dene Nation and English River First Nation. Along with the Clearwater River Dene Nation, these First Nations all belong to the Meadow Lake Tribal Council.

The environmental impacts of oil sands development, such as acid rain, will extend well beyond these communities to affect First Nations to the east, south and north that are part of the Prince Albert Grand Council. Already, some members of the Prince Albert Grand Council are expressing concern.

Figure 7. Clearwater River Provincial Park lies immediately south of the oil sands lease area in Saskatchewan.▼

1.5. Nuclear Power and the Oil Sands

Oil sands development in both Alberta and Saskatchewan is driving another controversy for meeting energy needs in both provinces — the proposed construction of one or more nuclear reactors. Bruce Power, an Ontario-based nuclear reactor operator, is in the process of seeking provincial government approval for reactor construction in both Alberta and Saskatchewan.

In Saskatchewan, Bruce Power has proposed the construction of a nuclear power plant along the North Saskatchewan River.⁷⁸ At the time of writing it is in the site selection process.^{79,80} To date Bruce Power has particularly focused on the area of the North Saskatchewan River between Lloydminster and Prince Albert. For example, in early 2009 Bruce Power sought options on riverbank land in the Rural Municipality of Britannia, east and north of Lloydminster. In April of 2009 at their



PHOTO: CHURCHILL RIVER CANOE OUTFITTERS

annual ratepayers meeting the residents of Britannia voted 95% against the location of a nuclear power plant in their community.⁸¹ Bruce Power has since approached other communities along the North Saskatchewan River in the hopes of finding one that is willing to host their project.

Bruce Power has made it clear that a large part of the rationale for a Saskatchewan-based nuclear reactor is to provide electricity to Alberta, particularly the Alberta oil sands. In its Saskatchewan feasibility study, Bruce Power concludes: "In addition to supporting Saskatchewan's electricity needs, a nuclear facility could also be used to export electricity to Alberta."⁸² Bruce Power emphasizes that it is northeastern Alberta (where the bulk of the oil sands are located) that presents the primary export market for Saskatchewan nuclear-generated electricity. It estimates that Alberta "may require up to 9,000 megawatts of new generation."⁸³

The future electricity demand in Alberta is very uncertain, particularly as a result of reduced oil and natural gas prices that have significantly slowed the development of new industrial projects. Regardless of the demand, the sale of power into Alberta would require the Province of Alberta to build significant electrical transmission capacity to the border to accept the power. This process would involve significant public consultation and risks that Albertans would not agree to such a project.



▲ *Figure 8. Nuclear waste is highly toxic for tens of thousands of years.*

Saskatchewan's current electricity system has approximately 3,600 megawatts of installed capacity.⁸⁴ Nuclear power plants are typically on the order of at least 1,000 megawatts and are considered "must-run" — that is they are very inflexible in their output. This constraint has been a problem recently in Ontario, which has had to sell power at negative prices (i.e., it has to pay consumers to use power) when demand dropped below the minimum supply of its nuclear fleet.⁸⁵ Integrating this into Saskatchewan's existing power grid would be a significant challenge.

What Bruce Power did not address in its feasibility study is the large economic and environmental risks such a project poses for the people of Saskatchewan. Nuclear reactor construction projects have a history of design problems and significant cost over runs. For example, one of the reactor designs Bruce Power is seriously considering is the Evolutionary Pressurized Water Reactor that AREVA is now constructing in Finland.⁸⁶ That project is already more than \$3 billion over budget and three years behind schedule.⁸⁷

Large bills for ratepayers are not limited to reactor construction. Repair costs are often more expensive than predicted. For example, repairs at Unit 2 of the Bruce Power nuclear generating station in Ontario were revised upwards to at least \$3.05 billion in 2008. Repair costs jumped sharply when unexpected dust, water and corrosion problems were found inside the reactor.⁸⁸ Decommissioning the radioactive core of a nuclear power plant after its operating life is over and hauling the radioactive debris away will also be exceptionally costly.⁸⁹

In June 2009, the Government of Ontario suspended plans to build a new nuclear power plant. The Ontario Energy Minister argued that the price would have to drop by "billions of dollars" for Ontario to proceed.⁹⁰

One example of the environmental problems a nuclear reactor poses is the intensely radioactive waste it always creates.

PHOTO: ROBIN BACKER



▲Figure 9. Saskatchewan's provincial flower, the western red lily, is common in the forests of northwestern Saskatchewan.

This waste material is relatively small in quantity, but the radioactive poisons that are created do not exist in nature and are highly toxic. Over 200 radioactive poisons are created in every used fuel bundle.⁹¹ This waste material is hazardous for tens of thousands of years and must be kept out of the natural environment over those time periods.

The Canadian nuclear industry is working on plans to dispose of these wastes in an underground repository, likely in the Canadian Shield. The greatest risk of such a plan to future generations is groundwater contamination. To date, there are no long-term disposal sites for used nuclear fuel bundles in Canada. All these spent fuel bundles currently are stored on site in the hopes of finding a long-term solution.

A reflection of the serious difficulties associated with handling high-level radioactive waste can be seen in the recent decision by the United States government to drop the plans for its own disposal site.⁹² Approximately \$11 billion was spent trying to make Yucca Mountain, Nevada, a suitable radioactive waste repository.⁹³ Now the United States is effectively without a disposal plan.

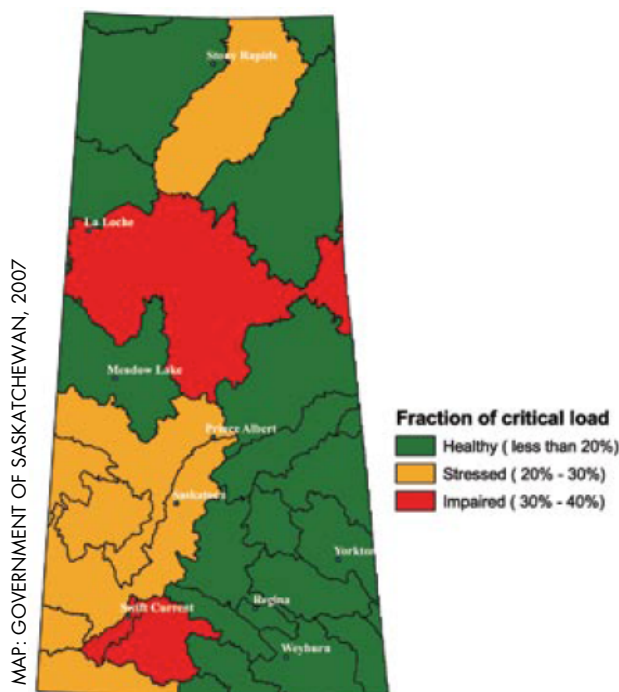
Other environmental problems posed by a nuclear reactor are the release of radioactive tritium in local water supplies and the risks associated with disposing of the lower-level radioactive wastes also produced by a nuclear reactor. Both of these problems have been in the news recently in Ontario. Over the past year, radioactive heavy water from the Chalk River nuclear reactor has been leaking and has been discharged into the Ottawa River.⁹⁴ Meanwhile, the Macomb County Water Quality Board is opposing a plan to deposit low-level radioactive waste near the Bruce nuclear reactor adjacent to Lake Huron.⁹⁵ The Water Quality Board fears that a disposal site with hundreds of radioactive pipes and contaminated filters from irradiated fuel pools could ultimately contaminate Great Lakes drinking water. Clearly, building a nuclear reactor in Saskatchewan for electricity generation purposes will add significant costs to Saskatchewan electricity rate-payers while increasing the environmental risks posed by oil sands development.

2.1. Acidification

Acid rain describes deposition of material from the atmosphere that contains higher amounts of nitric and sulphuric acids than usual.⁹⁶ Acid rain can be caused by emissions of sulphur dioxide and nitrogen oxides, which are the result of the combustion of fossil fuels.⁹⁷ These acidifying emissions become mixed in the atmosphere and can travel long distances.

It can take 2–14 days before acid rain deposits on land or water. As a result, acid rain can easily fall as much as 1,000 kilometres away from the original pollution source.⁹⁸

Acidity is measured by pH on a scale of 1 to 14. Low pH means high acidity. The middle number of the pH scale is 7.0. Higher than 7.0 is not acidic. Lower than 7.0 is acidic.



▲Figure 10. Critical load is the amount of pollution, in this case acid rain, an ecosystem can tolerate before it is damaged.

2.1.1. Alberta's Oil Sands Emissions

The prevailing winds carry acidifying emissions from Alberta into the Saskatchewan air shed. Distinguished acid rain scholar Peter Dillon estimates that 65–70% of the emissions from Fort McMurray are blown on the winds into the province of Saskatchewan.⁹⁹ Already, more than 150,000 tonnes of acid-producing sulphur dioxide and nitrogen oxide emissions are released each year from the oil sands operations in Alberta.¹⁰⁰ Any construction of oil sands plants in Saskatchewan will add to this atmospheric pollution. Because of the energy-intensive nature of oil sands extraction and production, the oil sands industry releases more sulphur dioxide and nitrogen oxides into the air than conventional oil production for each barrel of oil it produces.¹⁰¹

2.1.2. Effects of Acid Rain

The extent of damage caused by acid rain depends on the amount deposited and the sensitivity of the area receiving it. Whether or not an area is being harmed by acid rain is determined by its “critical load,” which is the amount of pollution load an ecosystem can tolerate before it is damaged.¹⁰² Areas in northern Saskatchewan are particularly sensitive to acid rain. Already, in some parts of northwestern Saskatchewan more acidity is being deposited than the environment can tolerate (see Figure 10). In fact, recent data for forest soils gathered for the Canadian Council of Ministers of the Environment suggests that Saskatchewan's north is the most acid sensitive region in Canada.¹⁰³

Acid rain can harm the soil by leaching out soil nutrients, such as calcium, which are needed for forest growth¹⁰⁴ and by releasing aluminum, which can kill fine root hairs in many forest species. Acid rain

can damage the forest by reducing photosynthesis and growth, increasing the vulnerability of trees to disease, insects and drought and ultimately causing the death of trees. Acid rain also has negative human health effects contributing to respiratory diseases like bronchitis and asthma.¹⁰⁵

In northern lakes bacteria, algae, insects, big water plants, fish, clams, snails, crayfish and many species of frogs are all negatively affected by acid rain.¹⁰⁶ Acid rain can kill fish in many different ways. Fish can be starved because acid rain kills their food source. Fish and fish eggs can be poisoned directly or indirectly by the toxicity of the acid. Different species are affected at different levels of acidity. For example, rainbow trout begin declining when pH drops below 6.0, while brook trout only decline when the pH drops below 5.0^{107,108}

2.1.3. Acidification in Saskatchewan

To date, lakes in northwestern Saskatchewan generally have a pH level that is between 6.0 and 7.0. They are therefore still considered to be healthy water bodies.¹⁰⁹ However, precipitation falling on these lakes can have a pH of under 5.0, which is a level that Environment Canada considers acid rain.¹¹⁰

The area of northwestern Saskatchewan that appears to be the most vulnerable to current levels of acid precipitation is the La Loche–Clearwater region and the lands where oil sands exploration is now occurring. Several models show that forest soils in this area are already exceeding critical loads for sulphur and nitrogen.¹¹¹

2.1.4. Acid Rain Monitoring

Prior to the autumn of 2007 there had been very little monitoring for acid rain in northern Saskatchewan, but that is now beginning to change. In September 2007 Saskatchewan Environment did sampling work in 150 headwater lakes in northwestern Saskatchewan. In October 2007 they started a wet deposition collection program for pH. In 2008 Saskatchewan Environment

conducted assessment for pH in 200 northwestern Saskatchewan lakes, many of which are headwater lakes.¹¹² Environment Canada has also embarked on its own assessment work to examine pH levels in approximately 300 lakes encompassing all regions of northern Saskatchewan.¹¹³

Unfortunately, Environment Canada's work does not yet include monitoring for the acidity of precipitation.¹¹⁴

In 2003, the Mackenzie River Basin report identified the risk of oil sands development in Alberta to Saskatchewan, stating: "Up to 70% of the sulphur dioxide and nitrogen oxides emitted by Alberta oil sands operations are deposited in Saskatchewan. The Government of Saskatchewan is concerned that these acidifying emissions could lead to the acidification of lakes in north central Saskatchewan."¹¹⁵



PHOTO: X. FANG

▲Figure 11. Saskatchewan's northern forests are particularly sensitive to acid rain.

2.2. Water: Downstream Impacts at Lake Athabasca

There are ongoing concerns about the effect of oil sands development on Lake Athabasca, the large lake that straddles the Alberta-Saskatchewan border downstream from the oil sands (see Figure 6). Because the Athabasca River flows into Lake Athabasca near the Slave River outlet, water from the river tends to flow through the west end of the lake quite directly, and most of the time there is no substantial mixing with water in the main part of the lake.¹¹⁶ Inflowing water from the river usually is restricted to an area that reaches about eight kilometres offshore from the delta. However, during periods of high inflow combined with strong westerly winds, the Athabasca River water can flow east well into Saskatchewan.¹¹⁷

Oil sands mining releases a number of toxic chemicals. Of primary concern are arsenic, naphthenic acids, mercury and polycyclic aromatic hydrocarbons (PAH). PAH are a group of more than 100 different chemicals formed during the incomplete burning of coal, oil and gas. The majority of PAH and metal emissions in the oil sands region can be attributed to combustion of diesel fuels from the mining fleets.¹¹⁸

There are no Canadian guidelines for sediment concentrations of total PAH, but it has been noted that the sediment levels of total PAH in the Athabasca Delta are double the threshold known to cause liver cancers in fish.¹¹⁹ Aquatic monitoring related to potential oil sands impacts has been so far restricted to the delta of Lake Athabasca and not the lake as a whole.

There is some controversy in Alberta about discrepancies in monitoring results between the industry-sponsored Regional Aquatics Monitoring Program (RAMP) and independent assessments of water and sediment quality downstream of oil sands mines.¹²⁰ The conclusions drawn by the

researchers can be dramatically different. For example, compare the following two conflicting statements:

Industry-sponsored study finds few differences from regional baselines

The differences in sediment quality conditions in the lower Athabasca River mainstem and the ARD (Athabasca River Delta) as compared to regional baseline sediment quality conditions are classified as Negligible-Low. Concentrations of sediment quality from stations in the Athabasca River mainstem and ARD in 2008 were generally within the range of previously measured concentrations, there were few exceedences of sediment or soil quality guidelines and little consistent regional differences in the Athabasca River mainstem and ARD between test and baseline areas.¹²¹

— Regional Aquatic Monitoring Program (RAMP)

Independent study finds pollutants have risen 72% from historical average

Taken together, the data indicate that sediment concentrations of PAHs in the lower Athabasca River and the adjacent delta and western Lake Athabasca can vary greatly in time and space and may at times exceed guidelines. ... Each of the four study sites, and the aggregate group, showed an apparent trend of increasing PAHs from 2001–2005. ... PAH levels in sediments have risen as much as 72% above the historical means in some areas.¹²²

— Dr. Kevin Timoney, Nunee Health Board Society Report

3.1. Air Pollution

The oil sands industry is a major source of air pollution. Of particular concern are the release of sulphur oxides, nitrogen oxides and volatile organic compounds. These emissions are categorized as criteria air contaminants — pollutants that are known to affect human health and to contribute to air quality problems such as smog and acid rain.¹²³ According to Pollution Watch, Alberta is responsible for more criteria air contaminant emissions than any other province in Canada.¹²⁴ A significant portion of these emissions are the result of oil sands operations. For instance, in 2006, the oil sands industry reported emissions of 122,000 tonnes of sulphur oxides, 37,000 tonnes of nitrogen oxides and over 61,000 tonnes of volatile organic compounds (see Table 1).

Nitrogen oxides are emitted primarily from the combustion of fossil fuels (e.g., natural gas and diesel) used to power machinery and produce heat. Nitrogen oxides can cause respiratory problems and also contribute to smog and acid rain.¹²⁵ When combined with volatile organic compounds and sunlight, they can also form ground level ozone.

Similarly, sulphur oxides contribute to smog and the formation of haze. They are also the major component in the

production of acid rain. In high concentrations, sulphur oxide emissions can have a direct affect on human health, causing respiratory illness and aggravation of pre-existing cardiovascular disease.¹²⁶

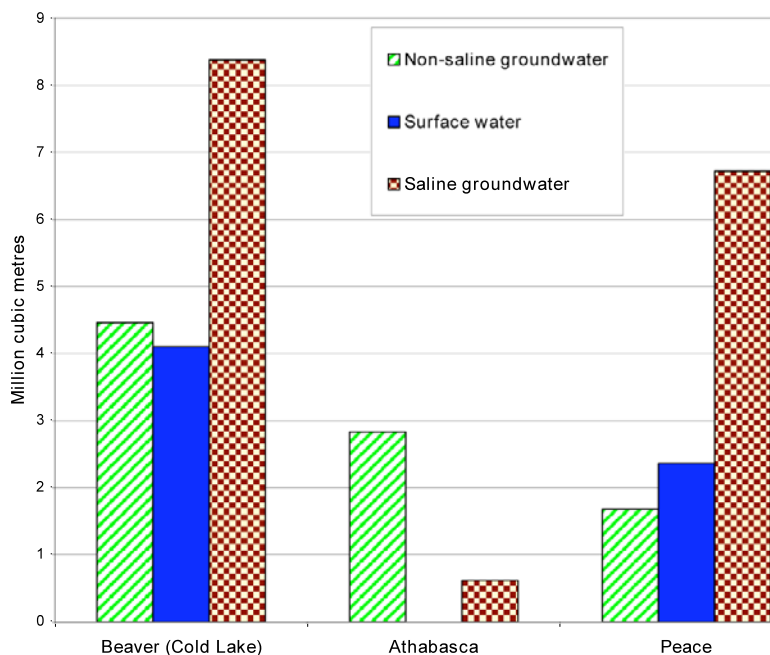
Volatile organic compounds are a large group of chemicals that may individually be toxic, but can also be part of a chemical reaction that forms ground level ozone. This ozone can adversely affect human health and plant growth. While in situ operations produce relatively little volatile organic compounds, large quantities are released during upgrading processes. Because all oil from the oil sands must first be upgraded before it can be used as synthetic crude, the air pollution associated with upgrading will become a concern to Saskatchewan.

Looking at Alberta as an example, the development of an oil sands industry in Saskatchewan will be responsible for large releases of criteria air contaminants. Other air emissions, including hydrogen sulphide, carbon monoxide, polycyclic aromatic hydrocarbons and particulate matter may also be of concern, especially through the upgrading processes.¹²⁷ Furthermore, if Saskatchewan in situ projects opt to reduce their dependence on natural gas by burning alternative fuel sources such as petroleum coke, releases of heavy metals into the atmosphere may become an additional concern.

Table 1. Oil sands industry criteria air contaminant emissions

| Source: | SO _x (tonnes) | NO _x (tonnes) | VOCs (tonnes) |
|---------------------------------|-----------------------------|-----------------------------|------------------|
| Upgrading | 112,831 | 26,270 | 38,851 |
| In Situ Operations | 9,043 | 9,752 | 1,200 |
| Mining Operations | 61 | 1,099 | 21,391 |
| Total Oil Sands Industry | 121,935 | 37,121 | 61,442 |

DATA SOURCE: Environment Canada, 2006 Air Pollutant Emissions for Canada Version 1, April 2008 (2009, NPRI), http://www.ec.gc.ca/pdb/websol/emissions/2006/2006_canada_e.cfm.



▲Figure 12. Water Consumption for In Situ Bitumen Production in the Beaver, Athabasca and Peace River Basins in Alberta, 2007.¹²⁸

DATA SOURCE: Alberta Environment, personal communication, November 7, 2008.

3.2. Water

In situ oil sands development poses potentially large cumulative impacts to water resources, and concerns have been raised regarding the ability to monitor and protect the groundwater within in situ development areas.

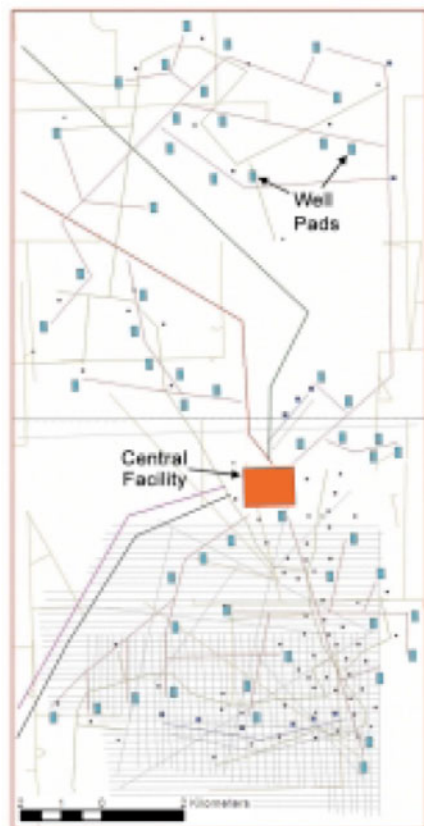
In situ projects in Alberta, developed mostly through the use of SAGD technology, use groundwater as their primary water supply. The water used in the SAGD process is in the form of steam to reduce the viscosity of the bitumen so it can be pumped to the surface. Accounting for the water that is recycled throughout the process, a net amount of approximately 0.9 barrels of water is used to produce one barrel of oil.¹²⁹ This water use is significantly higher than the 0.1–0.3 barrels of water it takes to produce a barrel of oil from conventional sources.¹³⁰

The complex hydrology of groundwater

in Alberta and Saskatchewan is not fully understood. Aquifers can lie beneath buried valleys and channels and can also be interconnected with each other and to surface water. Very few long-term groundwater monitoring wells have been established in Alberta. As a result, there is no adequate record of baseline conditions of groundwater in the oil sands development region.¹³¹ This groundwater resource has the potential to not only be affected by water users, but also by effects of climate change over the long term. The impacts of groundwater use may not be immediately evident, because groundwater moves slowly relative to surface water. The replenishment of groundwater aquifers can take a long time, which also means that any potential impacts to water quality or quantity may also be long-lived.

About half of the water used in the in situ projects in Alberta is saline groundwater (Figure 12). Oil sands companies have been using saline groundwater because of its availability, and they have maximized the use of this saline water in order to reduce the use of freshwater in their operations. This solution for water use is not perfect, however, because the use of saline water results in higher treatment costs and greater energy use, and the treatment of saline water results in greater amounts of waste that must be disposed of in deep aquifers or in landfills.¹³²

There are also concerns about the impact that in situ development could have on water quality in the area. Waste disposal in deep aquifers, potential well blowouts and the thermal plume (heat transmitted to areas adjacent to the heated reservoirs) created through the SAGD process pose a threat to adjacent aquifer water quality.¹³³ The elevated mineral levels that can occur in the thermal plume around an injection well could move away from the immediate site within the thermal plume. Of primary concern is the mobilization of naturally occurring arsenic during this process.¹³⁴



▲ Figure 13. Generalized pattern of in situ landscape disturbance using data from the OPTI-Nexen Long Lake SAGD project.

3.3. Boreal Forest and Wetlands

Although in situ oil sands developers are keen to distance themselves from the significant surface impacts associated with oil sands mining,¹³⁵ in situ oil sands projects can have major impacts on terrestrial ecosystems. A typical project includes an aboveground interconnecting pipeline system between the well pads and the central facility, including a steam supply line, a produced bitumen/water line, and a produced gas and steam line. There will also be overhead power lines to each pad, an underground pipeline for lift gas, and an all-weather service road.

In 2006, a study by Pembina Institute and Canadian Parks and Wilderness Society examined the projected impact of in situ oil

sands development. The study found that although only about 8% of a given in situ oil sands lease area will be cleared for infrastructure,¹³⁶ the density of roads, pipelines and powerlines will be 3.2 kilometres per square kilometre.¹³⁷ Within a typical in situ project approximately 80% of the land was projected to be within 250 metres of an industrial feature.¹³⁸

Rather than being low-impact from a terrestrial perspective, recent research reveals that the land area influenced by an in situ project is actually comparable to land disturbed by surface mining when impacts of fragmentation and increased upstream natural gas production are considered.¹³⁹

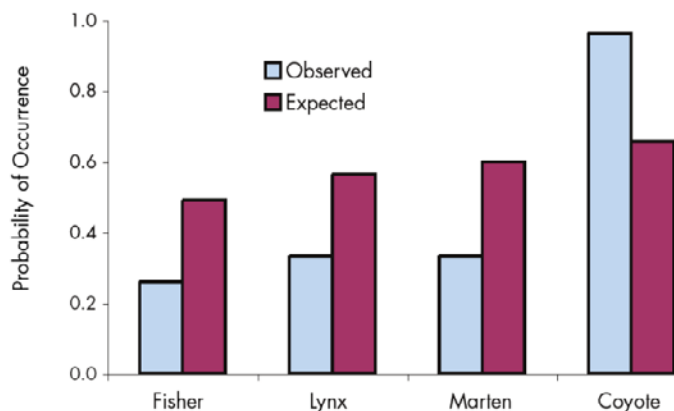
3.4. Wildlife

Oil sands development in Saskatchewan will be taking place in the boreal forest, which is habitat for many wildlife species known to be sensitive to industrial disturbance. In situ development is far more intense, widely distributed and long-lived than conventional oil development, and as a result its effects on wildlife will be more severe than conventional development.

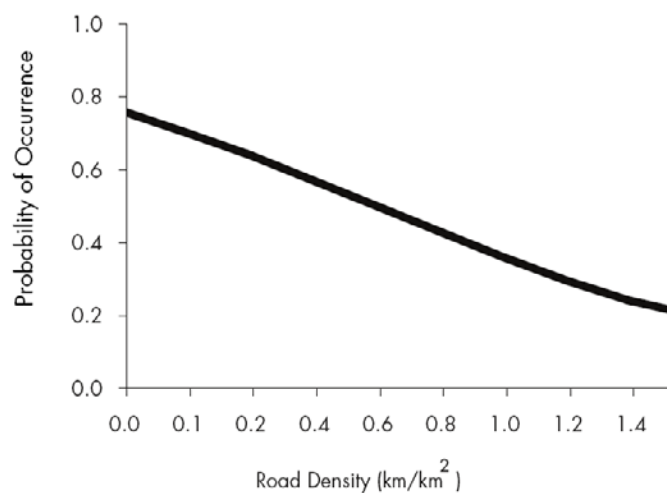
Woodland caribou is one of the species likely to be extirpated from regions subjected to in situ development unless conservation areas or maximum limits on industrial development are implemented.¹⁴⁰ Studies have shown that forests within one kilometre of roads and well sites tend to be avoided by caribou.¹⁴¹ The many roads and pipelines necessary for a SAGD project fragment caribou habitat, and act as barriers to their movement.¹⁴² Many forest birds such as the rose breasted grosbeak, brown creeper and yellow bellied sapsucker are also sensitive to industrial disturbance and tend to avoid suitable habitat within 100 metres of roads, pipelines, well pads or similar features.¹⁴³

Furbearing mammals, such as lynx, martens, and fishers, are also affected by industrial development. A recent study has

shown that population sizes have remained at expected levels in relatively intact regions of north eastern Alberta, but have significantly declined in regions subjected to industrial development (see Figure 14). Declines can be correlated with increasing levels of industrial infrastructure, such as the relationship between roads and lynx occurrence (see Figure 15).¹⁴⁴



▲ Figure 14. Most furbearing mammals are observed with less frequency than expected in the Alberta oil sands area.



▲ Figure 15. Lynx occurrence declines as road density increases.

Despite the impacts of development on wildlife in northeastern Alberta, the positive news is that time still exists to properly protect wildlife and habitat. A report by the Alberta Biodiversity Monitoring Institute notes that the condition of birds and

vascular plants in northeastern Alberta is still 94% intact.¹⁴⁵ Although the regional-level declines are small, it is important to note that many areas have not yet been subjected to industrial development, and the declines have occurred while only 3% of Alberta's bitumen has been extracted.¹⁴⁶ Land-use planning is now underway in Alberta, but may be complicated by industrial commitments, such as mineral leases and forestry tenure, that were made prior to adequate assessment.

3.5. Greenhouse Gases

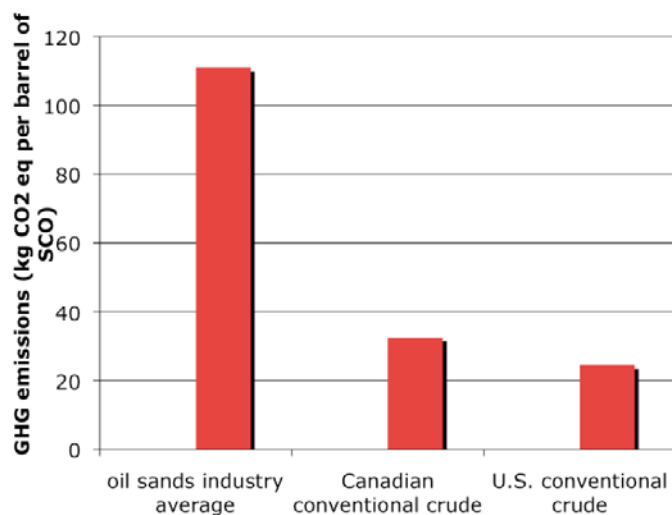
Oil sands operations are a major and growing source of greenhouse gas pollution. Oil sands plants and upgraders are already producing 40 million tons of greenhouse gas emissions each year,¹⁴⁷ which alone accounts for 5% of Canada's total emissions.¹⁴⁸ In fact, oil sands are the fastest-growing source of greenhouse gas emissions in the country.¹⁴⁹ Forecasts suggest that, in a business-as-usual scenario, Canada's emissions will increase by 24% from 756 million tonnes in 2006 to 937 million tonnes in 2020.¹⁵⁰ In this time, oil sands emissions are expected to nearly triple to 108 million tonnes per year and account for 44% of Canada's increase in emissions.¹⁵¹

Oil sands development is a major contributor to Canada's greenhouse gas emissions not only because of the large scale of operations, but also because of the energy intensive nature of the processes. Large amounts of fossil fuels are burned to produce the energy needed to extract bitumen from the oil sands and to upgrade the bitumen into synthetic crude. When looking at the oil sands industry in Canada as a whole, 111 kilograms of greenhouse gas emissions are produced to make just one barrel of synthetic crude.¹⁵² When compared with conventional crude produced in North America, the average emissions intensity to produce synthetic crude from oil sands is 3.2 to 4.5 times

higher (see Figure 16).^{153,154}

Within the oil sands industry, differences exist between the emissions intensities of different extraction techniques and the properties of the geological formation being exploited. When mining techniques are used, the greenhouse gas emissions fall within the range of 62 to 164 kilograms of carbon dioxide equivalent per barrel of synthetic crude¹⁵⁵ (Kilograms of carbon dioxide equivalent is the standard unit of measurement for greenhouse gas emissions.) Oil sands operations using in situ methods are more greenhouse gas intensive because of higher energy requirements, emitting in the range of 99 to 176 kilograms of carbon dioxide equivalent per barrel of synthetic crude.¹⁵⁶

In Alberta, approximately 40% of the oil produced from oil sands is currently extracted using in situ techniques.¹⁵⁷ In contrast, oil sands formations in Saskatchewan can only be accessed by in situ methods. For this reason, Saskatchewan would expect higher emissions per barrel of bitumen than those observed in Alberta.



▲ Figure 16. A comparison of GHG emissions resulting from the production of one barrel of oil sands synthetic crude,¹⁵⁸ Canadian conventional crude¹⁵⁹ and United States conventional crude.¹⁶⁰

"At first everyone thought that development would be great for the community...After 40 years of development we now see how much destruction has happened here...it's terrible..."

— Pat Marcel, Athabasca Chipewyan First Nation Elder, August 2008

3.6. Aboriginal Peoples

In Alberta, there are several Aboriginal communities living adjacent to and downstream from oil sands development. While some individuals feel they have benefitted from the jobs and opportunities that the oil sands have brought to their communities, many Aboriginal people have become concerned about the pace and scale of development of the oil sands.

Concerns of these groups have centered on water quality and quantity, loss of traditional ways of living and traditional knowledge, ability to consume country foods and lack of transparency in the way monitoring data is collected and communicated. The main concern of these groups however remains the health of their people. This has been particularly highlighted by the community of Fort Chipewyan, where a recent study found a 30% higher rate of cancer than was expected.¹⁶¹ Members of this downstream community are calling for an in depth health study to determine the cause of these elevated rates of cancer.

Three First Nations in Alberta have taken legal action against the Government of Alberta because of the lack of consultation prior to granting of tenures for oil sands leases and the lack of proper baseline studies into how the impacts of oil sands affect treaty rights:

Beaver Lake Cree Nation v. Alberta (May 14, 2008): "... in granting certain tar sands (and other) tenures, the Governments of Alberta and Canada infringed upon the treaty rights of the BLCN to hunt, trap and fish certain wildlife species in their traditional territory."

Chipewyan Prairie Dene First Nation v. Government of Alberta (June 4, 2008): "Government of Alberta has an obligation to conduct proper baseline studies, a cumulative effects study and an environmental impact study with respect to the potential impacts of the tar sands tenure on the CPDFN's treaty and aboriginal rights."

Athabasca Chipewyan First Nation v. Minister of Energy (Alberta), Canadian Coastal Resources Ltd., Standard Land Company Inc. and Shell Canada Inc. (December 10, 2008): "Alberta's granting of certain tar sands tenures without consultation with the ACFN."

"The federal government is neglecting its environmental responsibilities and ignoring our concerns. When the government fails to engage with First Nations about our concerns, and fails to respect our rights, these things have nowhere to go but the courts."¹⁶²

*— Chief Allan Adam, Athabasca
Chipewyan First Nation*

4.1. Regulations Governing Oil Sands Development

*"Oil sands dispositions feature oil sands rights from the surface to the top of the Devonian System and are offered in the region consisting of Twp 74 north to the Precambrian shield and from the 4th meridian east to the Precambrian shield. For regulatory purposes oil sands are considered to be all sands and rocks in the region and in the formations listed above that contain a highly viscous mixture, composed mainly of hydrocarbons heavier than pentanes that will normally flow, in its natural state, to a well."*¹⁶³

In Saskatchewan, the legislated mandate for the responsible development of the province's oil and gas resources is set out in the Department of Energy and Mines Act that provides the minister with responsibility for the exploration, development, management and conservation of non-renewable resources.¹⁶⁴ The Oil and Gas Conservation Act allows the orderly exploration for, and development of, oil and gas in the province and optimizes recovery of these resources.¹⁶⁵ In May 2007 the Government of Saskatchewan announced new regulations that are intended to encourage more exploration of the province's oil sands and oil shale resources.¹⁶⁶ The new regulations are an update of regulations approved over 40 years ago.

Under the Petroleum and Natural Gas Amendment Regulations 2007, oil sands and oil shale mineral rights will be available

under the competitive bid and work commitment processes, respectively. Previously issued oil sands and oil shale dispositions (including those of Oilsands Quest) will continue to be administered under amended provisions to The Oil Shale Regulations of 1964, which have also been updated to today's technical and economic realities. As the only oil sands permit holder at the time of the amendments, Oilsands Quest was grandfathered under the new regulations.¹⁶⁷

Three types of dispositions are available:

- 1) **Special exploratory permits** are the largest disposition and are designed to encourage exploration. A bonus bid is submitted on the parcel in the Crown sale rather than a work commitment bid as is the case for permits for the other substances. However, a specific work commitment still exists on oil sands permits to ensure that exploration activities are performed on the lands. This disposition grants the right to explore for oil sands but not to remove, extract or produce oil sand or oil sand products until a *lease* is granted. Minimum size for a special exploratory permit is 10,000 hectares and the initial term is five years. The permit holder is required to file within four months of the end of each permit year a detailed report of exploration work done.
- 2) **Exploration licenses** include the right to both explore for and produce oil sands or oil sand products. The size can range from 1 to 36 sections (one section equals one square mile). Licenses are issued for a term of five years.
- 3) **Leases** convey the right to explore for and produce oil sand and oil sand products. Leases can be obtained in two ways, by exercise of rights under permits or exploration licenses, or by bid at Crown sales. Leases range in size from 16 hectares to a maximum of 9,324 hectares (36

sections). Land sales take place approximately every two months. A sale notice is published about two months in advance.¹⁶⁸ Operating permits are also required from the Ministry of Environment. These define the permit conditions for drilling/exploration operations, ecological protection requirements, project monitoring, etc.¹⁶⁹

Current environmental assessment legislation (The Environmental Assessment Act) requires that any activity defined as a “development” is subject to environmental assessment prior to ministerial approval. The criteria in the act that define development are broad enough that commercial exploitation of oil sand resources would be included. Saskatchewan Environment has noted: “As the intensity of activity in this area increases, or as the work shifts from an exploratory phase to activity that may result in extraction or development of the resource, it is reasonable to expect that an environmental impact assessment will be triggered and a comprehensive public review will result. An environmental impact assessment will also consider the potential for cumulative impacts in a broader area.”¹⁷⁰

Saskatchewan’s environmental legislative and regulatory system is presently under review.¹⁷¹ There is therefore some uncertainty about changes that may be in place by the time commercial development of the oil sands is proposed. Preliminary discussions (see documents referenced above) suggest there could be a greater reliance on class assessments and strategic regional assessments to expedite the environmental assessment process.

4.2. Development before Planning

Completing planning to ensure the environment is protected in the face of oil sands development has been a lower priority than ensuring oil sands expansion

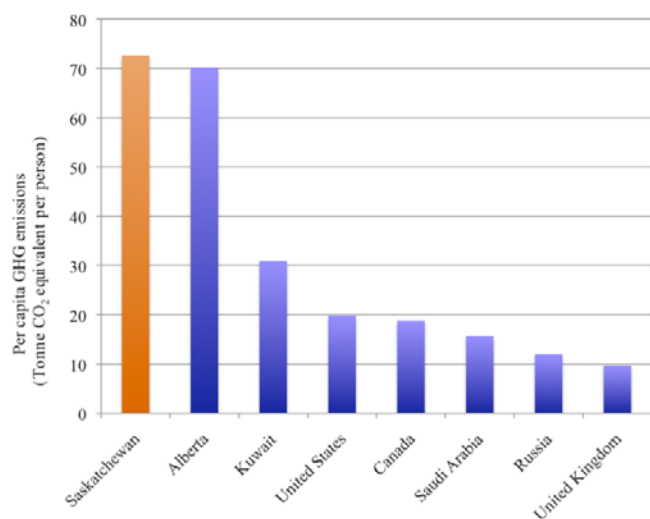
in Alberta. In 2009, the Government of Alberta released *Responsible Actions: A Plan for Alberta’s Oil Sands*¹⁷² — a full 10 years after launching a Regional Sustainable Development Strategy that was supposed to address concerns about cumulative environmental impacts of oil sands development.¹⁷³ Land use planning has not been completed for the Lower Athabasca Region, although a regional plan is supposed to be complete by 2010¹⁷⁴ and many environmental limits have yet to be implemented.¹⁷⁵

To date, oil sands exploration is taking place in northwestern Saskatchewan north of La Loche. Exploration has proceeded in the absence of a regional land use plan. A proper regional land use planning process could contribute significantly to identifying lands worthy of protection and how to manage industrial activity on the landscape.

Despite the absence of a regional land use plan, some preliminary work to identify lands worthy of protection was done by the Provincial Lands Branch and environmental organizations in 2007–08. The Provincial Lands Branch worked with the Saskatchewan Environmental Society, Mistik Management (a forestry company in northwestern Saskatchewan), the World Wildlife Fund, Saskatchewan Wildlife Federation, Nature Saskatchewan and Ducks Unlimited to develop a potential suite of protected areas in Mistik’s forest license area.¹⁷⁶ To the credit of Mistik Management, the company made a commitment to defer logging in these areas until full public consultation on each candidate protected area takes place. However, late in 2008 the Government of Saskatchewan ignored the work of its own Lands Branch and made one of the most important candidate protected sites available for lease for oil sands exploration and development. This case demonstrates how oil sands exploration is being allowed to run roughshod over the protected areas planning process.¹⁷⁷

One of the most spectacular areas that

was protected in northwestern Saskatchewan well before the current focus on oil sands is the Clearwater River Wilderness Park, north of La Loche. The park's 200,000 hectares were officially designated by the Government of Saskatchewan in 1986.¹⁷⁸ Within the last 10 years, several proposals were made to build on this legacy with the establishment of other protected areas adjacent to the park. All have been rejected by provincial government departments because of the mineral and oil sands potential on the proposed sites. This again demonstrates how the potential for oil sands interferes with the designation of lands that are highly valued for their ecological diversity and deserve to be protected in perpetuity.¹⁷⁹



▲Figure 17. Per capita greenhouse gas emissions of Saskatchewan compared with Alberta, and various countries. SOURCES: Environment Canada, Statistics Canada, United States Department of Energy¹⁸⁰

4.3. Greenhouse Gas Regulations

Human produced, heat-trapping greenhouse gases are currently being released into the atmosphere at more than double the rate at which nature can absorb them. For more than two decades, the

international scientific community has been warning of the danger this rate of release poses. In the United States, the Environmental Protection Agency has formally declared that greenhouse gases endanger the public.¹⁸¹

As the concentration of carbon dioxide in the atmosphere rises each year, its heat trapping qualities mean our planet's climate is being fundamentally altered. The changes in climate being brought on by human produced greenhouse gas emissions are already evident. Damage from severe weather events has skyrocketed in Saskatchewan over the last two decades, as it has around the world.¹⁸² Infectious diseases associated with warmer climates are moving north. Saskatchewan, for example, had more than 1,400 cases of West Nile Virus in 2007.¹⁸³ Lyme disease, a tick borne borreliosis, is expected to expand north 200 kilometres and become a problem in Saskatchewan.¹⁸⁴ One of the greatest risks that rising greenhouse gas emissions pose for Saskatchewan is severe and prolonged droughts. Natural Resources Canada's publication *From Impacts to Adaptation: Canada in a Changing Climate* forecasts climate change will cause average temperatures to rise 4–6° C in Saskatchewan by 2080 and warns the average annual temperature increase could rise as much as 10° C in parts of Saskatchewan.¹⁸⁵

Saskatchewan's annual greenhouse gas emissions were 72 million tonnes in 2007.¹⁸⁶ The provincial population was around a million people that year,¹⁸⁷ which means Saskatchewan's emissions were about 72 tonnes per person — three times the Canadian average (see Figure 17).¹⁸⁸ Saskatchewan's per person greenhouse gas emissions are so high that if Saskatchewan were a country, it would have the third-highest per-person emissions in the world.¹⁸⁹

The international scientific community is telling the industrialized world that by 2050 a reduction in worldwide greenhouse

gas emissions of 60–70% below 2005 levels is required in order to avoid a climate crisis. Steady progress on emissions reductions is required every decade, starting immediately.¹⁹⁰ In order to accomplish this magnitude of emissions reduction worldwide, a cut in greenhouse gas emissions of at least 80% is required among industrialized countries.

Canada is one of 39 industrialized countries that signed the Kyoto Protocol, the most important international agreement aimed at greenhouse gas reduction. Canada promised the world community in 2002 to reduce its national greenhouse gas emissions to 6% below 1990 pollution levels by the period 2008–12.¹⁹¹ However, Canada is presently 26% above its 1990 emission levels and is in violation of its international obligations.¹⁹² In response to this circumstance, the current government has decided not to try to meet these obligations at all. Instead, it has set a new greenhouse gas reduction target of 20% below 2006 greenhouse gas levels by 2020.¹⁹³

This non-willingness to take action to reduce greenhouse gas emissions in a meaningful way has earned Canada a reputation of being an obstruction to international climate change negotiations. Sir David King, former Chief Scientific Adviser to the UK Government, publicly announced that Canada was one of three countries responsible for blocking a deal on climate change in the lead-up to the Copenhagen summit,¹⁹⁴ while the government of France released a document calling on Canada to do more than currently proposed to tackle greenhouse gases.¹⁹⁵

In June 2007 the Government of Saskatchewan committed to lead a greenhouse gas reduction effort in the province. A reduction target of 32% of 2004 emission levels by 2020 was set.¹⁹⁶ This meant that Saskatchewan would try to “pull its weight” in meeting the national reduction required to fulfill Kyoto Protocol targets, albeit eight years behind schedule. However, the

current government has dismantled many of the mechanisms required to undertake this work and achieve these targets: the Office of Energy Conservation was phased out, and the Climate Change Secretariat was dismantled. A \$320 million climate change fund with monies for measures such as energy conservation, renewable energy and methane gas capture was largely redirected to other government spending priorities.^{197,198}

In April 2008 Saskatchewan Environment Minister Nancy Heppner announced new targets for greenhouse gas reduction: a 20% reduction of 2006 emission levels by 2020.^{199,200} By moving both the base year and the percentage reduction, the practical effect of this change is that instead of aiming for a 25 million tonne per year emission reduction, Saskatchewan will target an annual emission reduction of slightly more than 14 million tonnes. If oil sands development goes ahead in Saskatchewan, it will increase the province’s greenhouse gas emissions. Therefore if reduction targets are to be met, other industries in Saskatchewan will have to reduce their emissions to account for the increase in emissions by the oil sands industry.

Free Pass for Oil Sands Emissions?

“The federal government will allow some grandfathering up to 2012 for oil sands projects that are operating before then, before they really get onerous with regulations. It’s a concern to us, as we do not yet have a commercial oil sands project in place in Saskatchewan. We want one, and frankly, that deadline wouldn’t work for us. So we’re going to work very closely with the federal government — we’ve developed a bit of a positive relationship there — to ensure there are some Saskatchewan exemptions.”²⁰¹

— Premier Brad Wall, 2008

4.4. Royalty Regime

The people of Saskatchewan are the owners of Saskatchewan's oil sands resource. The provincial government manages this resource on behalf of the public. As manager, the government allows companies to undertake oil sands development. Companies incur costs associated with development of the resource and obtain revenue from their sale. The Saskatchewan government is responsible for ensuring a fair share of the revenue on behalf of the resource owners, who are the people of Saskatchewan. It is the government's duty as manager to maximize the value that the people of Saskatchewan derive from any development of the oil sands.

The government of Saskatchewan is encouraging investment in this province's oil sands by providing a royalty regime that leaves a greater share of the profits with industry versus the public, when compared with Alberta's oil sands royalty regime. Both provinces provide for a low initial royalty to be charged "prior to payout," i.e., until eligible capital costs and expenses have been recovered by the developer. After payout a higher royalty rate kicks in.²⁰²

The oil sands royalty regime for Crown Lands in Saskatchewan is simply based on 1% of gross revenues prior to payout and 20% after payout.

Alberta's regime was recently changed after criticisms that at high oil prices Albertans were not receiving adequate returns as owners of the resource. Effective January 2009 royalty rates in that province are determined by a sliding scale based on the price of West Texas Intermediate (WTI) oil in Canadian dollars per barrel. The Base Royalty Rate, charged on gross bitumen revenues prior to payout, is 1% up to \$55 per barrel; it increases for every dollar oil is priced above \$55 per barrel to a maximum of 9% when WTI is priced at \$120 per barrel. The Net Royalty Rate, charged on net bitumen revenues after

payout, is 25% up to \$55 per barrel; it increases for every dollar oil is priced above \$55 per barrel to a maximum of 40% when oil is priced at \$120 per barrel.²⁰³

The Government of Alberta did not follow the recommendations of the expert panel it struck to review oil sands royalty rates and has been subject to criticism that Albertans, as owners of the resource, are still not receiving their fair share of the economic benefits of oil sands development.

4.5. Where Is the Federal Government?

The Government of Canada has important jurisdiction in oil sands environmental management, in terms of protecting Saskatchewan from downstream and downwind impacts from oil sands development in Alberta, and by ensuring that any oil sands development in Saskatchewan is consistent with federal law. Despite many areas of jurisdiction, the federal government has played a very weak role in oil sands environmental management in Alberta. Failing to act is also increasing environmental risks for Saskatchewan.

4.5.1. Turning a blind eye to potential downstream impacts

Oil sands mining produces toxic liquid tailings that end up in large tailings ponds that currently cover 130 square kilometres.²⁰⁴ There is no proven strategy to reclaim all the waste materials created by oil sands mining. There is very limited publicly available information about the rate of leakage from tailings ponds into the Athabasca River and groundwater formations, but conservative projections suggest ponds are leaking at a rate of 11 million litres per day.²⁰⁵ This is of concern to many people who live in Saskatchewan because Lake Athabasca, which extends into Saskatchewan, is downstream from the oil sands mines.

Monitoring of water quality in the Athabasca River has largely been delegated to the Regional Aquatics Monitoring Program and has been criticized as inadequate.²⁰⁶ In May 2009 the House of Commons Standing Committee on Environment and Sustainable Development held hearings in Alberta on the issue of oil sands development and water. The Committee heard repeatedly from scientific, community and environmental witnesses that the Federal Government had failed in its responsibility for oversight and monitoring of oil sands development.²⁰⁷

In 2009 the Commissioner of the Environment and Sustainable Development reported that the Canada–Alberta Administrative Agreement for the Control of Deposits of Deleterious Substances under the *Fisheries Act* was out of date and not being fully implemented.²⁰⁸ The Commissioner reported that Environment Canada cannot demonstrate that the agreements with the provinces are active and being implemented, and it does not know the extent that the legislative frameworks of other jurisdictions can be relied on to support Environment Canada’s administration and enforcement of the pollution prevention provisions of the *Fisheries Act*.²⁰⁹ Despite growing concerns about the risk of downstream pollution from the oil sands it was noted that the Management Committee that governs the implementation and administration of the Agreement between Canada and Alberta has not met in over two years.²¹⁰

4.5.2. Failing to protect Saskatchewan from acidifying emissions from Alberta

Despite the growing evidence of acidification in northern Saskatchewan the Government of Canada has played a very passive role as acidifying emissions have increased. The Canadian Environmental Assessment Act enables the Government of

Canada to regulate acidifying emissions, such as nitrogen and sulphur oxides, but at present it is essentially the Alberta government that regulates how much pollution will be released into Saskatchewan’s airshed. In 2006, the federal government proposed regulations that would set some limits on nitrous oxide and sulphur dioxide levels, as well as a number of other air pollutants (e.g., mercury, volatile organic compounds),²¹¹ but in response to concerns from a variety of stakeholders they are currently re-working this plan.

4.5.3. Failing to protect species at risk

The federal government has the responsibility to protect species through the Species at Risk Act. Woodland caribou are a key indicator of ecosystem health, meaning the recovery of caribou in a region signals that the natural system is functioning. Based on the level of development that has been allowed to occur in the habitat of caribou in northeastern Alberta prior to land use planning, every woodland caribou herd in this part of Alberta is considered at risk of extinction.²¹² In Saskatchewan the Primrose–Cold Lake and Clearwater herds reside in areas available for oil sands development. These herds, although currently in better condition than Alberta’s are still considered to have habitat conditions in their ranges that are not-self sustaining.²¹³ Environment Canada recently commissioned a report from a Science Advisory Panel that used the best available science to review critical habitat for the species. A recovery strategy that legally defines critical habitat based on this report is urgently required. Despite the absence of this recovery strategy, Saskatchewan continues to lease lands for oil sands development in critical woodland caribou habitat.

5.1. Learn from Alberta's Mistakes

Alberta represents a cautionary example of how mismanagement of oil sands development can have significant environmental and social impacts. In Alberta oil sands development outpaced environmental management, and the Governments of Alberta and Canada are still struggling to catch up. This failure to adequately plan for and regulate oil sands development is responsible for the negative attention that the oil sands are receiving in Alberta, nationally and internationally. Saskatchewan has the opportunity to ensure that if oil sands development proceeds, it occurs in an environmentally responsible manner and in the best interests of the citizens of Saskatchewan. To do so requires a significant course correction.

Saskatchewan stands at the crossroads. Will Saskatchewan learn from the mistakes of its western neighbour, or will development of oil sands in Saskatchewan be characterized by the same feverish rush and lack of planning that defined oil sands development in Alberta?

5.2. A Responsible Approach to Oil Sands Development in Saskatchewan

This report has documented the significant risks that come with oil sands development. There is little evidence to date, at either the federal or provincial level, of the political will necessary to properly regulate potential oil sands development in Saskatchewan.

Meanwhile, Saskatchewan's natural environment is already being impacted by transboundary impacts from oil sands development in northeastern Alberta, impacts that would be exacerbated by oil sands development in northwestern Saskatchewan. We have discussed many critical risks of oil sands: the loss of sensitive and irreplaceable lands that deserve protection, the fragmentation of the boreal forest from oil sands development, the loss of biodiversity in the boreal forest, the acidification of lakes, rivers and streams in northern Saskatchewan, the risk of groundwater and surface water contamination with toxic wastes and the release of significant greenhouse gas emissions which are driving dangerous climate change.

While there are short term job and revenue benefits from oil sands activity, there are substantial risks that have not been adequately explored in Saskatchewan. These risks cannot be eliminated, but perhaps they can be minimized. What would be required to achieve that goal?

1. PAUSE GRANTING OF OIL SANDS DISPOSITIONS AND APPROVALS

We recommend a pause on oil sands lease sales and development approvals while public consultations on oil sands development occur. If oil sands development is supported by the people of Saskatchewan, a further pause would be necessary until a set of conditions are put in place aimed at minimizing environmental damage while ensuring maximum economic benefits for the people of Saskatchewan — most particularly the people of northern Saskatchewan.

2. ASK THE PEOPLE OF SASKATCHEWAN

We recommend that the Government of Saskatchewan complete a province-wide public consultation on the prospect of developing Saskatchewan's oil sands resources and engage the people of Saskatchewan in a meaningful public dialogue on their expectations on whether and how to develop Saskatchewan's oil sands resource.

3. ENSURE APPROPRIATE RULES ARE IN PLACE²¹⁴

Should the people of Saskatchewan prove to be supportive of oil sands development occurring, ensuring responsible development would require the implementation of a number of significant policy changes and improvements to environmental management and monitoring that are outlined below:

A) Complete a comprehensive regional environmental assessment of northwestern Saskatchewan and develop a regional land-use plan

A Regional Environment Assessment and Land-Use Plan for Northwestern Saskatchewan should be completed as a precondition to any further oil sands exploration and as a pre-condition to oil sands development.

B) Ensure full consultation with First Nations and Métis Peoples

Oil sands and their pollutants infringe on the hunting, fishing and trapping rights of Aboriginal Peoples. The Government of Saskatchewan and the Government of Canada have a constitutional obligation to consult with Aboriginal Peoples before any oil sands activity takes place on their lands. Moreover this constitutional right may well extend to pollutants that enter the lands of Aboriginal People from oil sands operations

some distance away.²¹⁵

In order for this consultation to be meaningful, it must take place before permits are issued to industry. Moreover, funding must be in place for First Nations and Métis governments to hire professional staff to evaluate oil company proposals and assist in identifying local conditions that must be met before any oil sands exploration and/or construction proceeds. First Nations and Métis governments should have the right to identify lands on which oil sands exploration and construction will not be permitted.

Consultation should not only be with local First Nations and Métis communities, but also with the Meadow Lake Tribal Council, the Prince Albert Grand Council, the Federation of Saskatchewan Indian Nations and the Métis Nation of Saskatchewan.

C) Complete Saskatchewan's Protected Areas Network

If oil sands development is to be allowed in Saskatchewan, the protected area designation process should be completed in northwestern Saskatchewan before any more oil sands leases are issued. This process should include full consultation with local First Nations and Métis communities. Subject to modifications that may emerge from the consultation process, the lands discussed earlier in this report, that were identified through the collaborative process between the Lands Branch and Saskatchewan environmental organizations, should be formally designated as protected areas.

Consistent with the Boreal Conservation Framework, the Government of Saskatchewan should target to give permanent protection to at least 50% of the lands in northwestern Saskatchewan to ensure that wildlife habitat is preserved and that biodiversity is protected for future generations.²¹⁶ The most suitable designation to achieve this purpose may be

to include these lands in Saskatchewan's Representative Areas Network, which prevents industrial activities such as logging, mining, oil sands and road construction, but permits other land uses such as hunting, trapping, fishing, hiking, etc.

D) Set greenhouse gas regulations that achieve absolute reductions

The international community will meet in Copenhagen in December 2009 and is almost certain to set much more stringent reduction standards than those called for by the Kyoto protocol. A cautious prediction for what will likely emerge is an agreement on reductions of at least 20% below 1990 greenhouse gas emission levels by 2020. Canada's 1990 emissions were 592 million tonnes, so under this scenario Canada would be expected to reduce emissions to 474 million tonnes. This would require Canada to make a 273 million tonne reduction in its annual emissions by 2020. Saskatchewan's proportional share of that would be just under 10% or approximately 26 million tonnes. The Government of Saskatchewan should therefore set in place a greenhouse gas reduction plan that aims to reduce emissions by 26 million tonnes by 2020. This essentially means reinstating the provincial target that was set in 2007. It is essential that the oil sands industry not be granted any special or preferential treatment under a cap and trade system to reduce greenhouse gas emissions. If an oil sands plant is built in Saskatchewan, it must be done in the context of these emission reduction targets; thus the rest of the oil and gas sector will have to further reduce emissions accordingly.

E) Require the use of the best available technology to minimize acidifying emissions

In Alberta, there are significant differences in nitrous oxide and sulphur dioxide emissions among the various oil sands

facilities. It is clear from the Alberta experience that large reductions in acidifying emissions can be achieved with the application of best available technology. The Government of Saskatchewan should therefore signal that a strictly enforced condition of project approval will be that any Saskatchewan oil sands plant operator must apply the very best technology available for the reduction of acidifying emissions.

In addition, the Government of Saskatchewan should put in place a comprehensive monitoring program to measure acid rain impacts in Northern Saskatchewan. Data should be gathered on a three- to five-year cycle from at least 3,000 lakes and a soil acidity monitoring program should also be embarked upon.

The Government of Saskatchewan should insist that the Government of Canada and the Government of Alberta take action to regulate and reduce acid rain emissions from Alberta's oil sands facilities, which currently pose a medium and long term risk to northern Saskatchewan. In addition to regulating individual oil sands plants, a regional cap on acid rain emissions is required.

F) Develop an adequate monitoring system for water resources

A comprehensive baseline study for groundwater and surface water should be completed in the area of Saskatchewan that contains the oil sands deposit, before any further exploration or development occurs. It is important to understand the complex hydrology of an area in order to know what impact drawing groundwater and disposing of waste materials in deep aquifers could have. It is also important to gather quality and quantity information on the water resources in the area to compare with any data that is collected after any potential development to know what types of impacts are being felt. Data collection before, during and after oil sands development should be

done consistently through a stringent monitoring program and preferably by the Government of Saskatchewan or an independent group that is arms length from the oil sands industry.

The Government of Saskatchewan also has a role to play in requiring oil sands companies to use the least amount of freshwater possible. This can be done by requiring companies to prove that they have used all possible alternatives to freshwater use before the Government will issue water licenses for oil sands projects.

In situ projects do have waste associated with their process that is typically disposed of in deep water aquifers. It is important that there are clear regulations laid out ahead of time by the appropriate regulatory agencies with regard to expectations around waste management. The full range of impacts need to be clearly understood and proper mitigation techniques need to be available before development should be approved.

G) Develop an adequate monitoring system for biodiversity

Saskatchewan should adopt a biodiversity monitoring approach equivalent to the comprehensive monitoring protocols developed by the Alberta Biodiversity Monitoring Institute.²¹⁷ The Alberta Biodiversity Monitoring Institute collects biodiversity information at 1,656 sites in Alberta using peer-reviewed and extensively tested protocols and includes data for over 2,000 species and habitats.

A rigorous and comprehensive monitoring program for the area of Saskatchewan underlain by oil sands would enable Saskatchewan to make informed decisions on oil sands environmental management. Implementation of biodiversity monitoring protocols equivalent to those delivered by the Alberta Biodiversity Monitoring Institute would have a projected annual cost of approximately \$900,000 per year.²¹⁸

H) Reform royalties

If the Saskatchewan government wants to avoid one of the Alberta governments greatest pitfalls, the province should consider reforming their current flat rate royalty regime to one that is progressive-capturing more value for the public as the value of the resource rises.

To capture windfall profits the government of Saskatchewan has a number of options at their disposal. Some of these options include a number of reforms to oil sands royalty regime like those described in a recent Pembina Institute report entitled *Royalty Reform Solutions*.²¹⁹ Further, should the government not choose to reform the royalty system the government could explore the use of capital taxes to enable the public to capture additional revenue sources from investment in the oil sands resource.

Investments in a Long Term Fund for Saskatchewan will be critical to the future of the region. For a province that is heavily reliant on fossil fuel based sectors (coal, oil sands and potash) there is a need to develop strategic investments funds to enable the province to shift its business reliance away from high fossil fuel dependence (and high pollution) to one that is better equipped to compete in a carbon constrained future.



PHOTO: HELENE WALSH

▲ *Figure 18. Dragonflies are just one of many aquatic animals negatively affected by acid rain.*

Endotes

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