

# CANADA'S TOXIC TAR SANDS

# THE MOST DESTRUCTIVE PROJECT ON EARTH



ENVIRONMENTAL | DEFENCE

FEBRUARY 2008

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We research solutions. We educate. We go to court when we have to.  
All in order to ensure clean air, clean water and thriving ecosystems nationwide,  
and to bring a halt to Canada's contribution to climate change.***

**NB: Page 4, Government Cover Up - Whistle-blower Silenced**

*Since publication of this report, the College of Physicians and Surgeons of Alberta has completed an investigation into cancer rates in the Fort Chipewyan community. The final report of the investigation, completed in November 2009, is available for review at:*

*<http://www.fcpp.org/files/1/CPSA%20Investigation%20Report%20-%20%200%27Connor%20Misconduct.pdf>*





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→ **Even the largest trucks in the world seem tiny in a Tar Sands mine.** CREDIT: DAVID DODGE, COPYRIGHT 2005



**Satellite image of a Tar Sands operation.**

*CREDIT: GLOBAL FOREST WATCH CANADA*

# INTRODUCTION

## The Most Destructive Project on Earth

Few Canadians know that Canada is home to one of the world's largest dams and it is built to hold toxic waste from just one Tar Sands operation. Everything about the Tar Sands happens on a massive scale. The enormous toxics problems go hand-in-hand with massive global warming pollution and the impending destruction of a boreal forest the size of Florida.

Because of sheer scale, all Canadians are impacted by the Tar Sands, no matter where they live. If you live downstream, your water is being polluted and your fish and wildlife may be dangerous to eat. If you live in Saskatchewan you are a victim of acid rain. If you live in BC, "supertankers" may soon be plying your shoreline carrying Tar Sands oil to Asia. If you live in Ontario, you are exposed to harmful emissions from the refining of Tar Sands Oil. And the impacts do not stop at Canada's border - US refineries are re-tooling to handle the dirty oil from Alberta.

Moreover, no matter where you live in Canada, your desire to tackle global warming is being held hostage to the Tar Sands. Instead of reducing greenhouse gas emissions, Canada is quickly increasing them, and fully half of that emissions growth is projected to come from the Tar Sands.<sup>1</sup> Because Canada's elected officials refuse to clamp down on Tar Sands operators, they also refuse to clamp down on industry across Canada for fear of a double standard.

And it is just beginning. Approvals have already been given that will double the size of existing operations, and our leaders have been talking with the US government to grow the Tar Sands five-fold in a "short time span."<sup>2</sup> The Tar Sands are now the biggest capital project anywhere on Earth and the biggest energy undertaking anywhere. Already, Canada is the largest foreign supplier of US oil.

With the Tar Sands, Canada has become the world's dirty energy superpower.

In the service of growing the Tar Sands, the Canadian government gives tax breaks to the worst polluters; it fails to enforce its own environmental laws; and it is even engaging in cover-up when people blow the whistle on how the Tar Sands have harmed our health and our environment.

It doesn't need to be this way. Technologies are available to curb the damage, yet the Canadian government so far refuses to force industry to clean up.

As Parliament's Natural Resources Committee recently stated:

**A business as usual approach to the development of the oil sands is not sustainable. The time has come to begin the transition towards a clean energy future.<sup>3</sup>**

All Canadians should join the chorus of leading figures such as Peter Lougheed, the former Premier of Alberta, in calling for a moratorium on new projects and a clean up of the Tar Sands. Premier Lougheed, originally instrumental in scaling up the Tar Sands, now says:

**...it is just a moonscape. It is wrong in my judgment, a major wrong... So it is a major, major federal and provincial issue."**

***This is Canada's problem. It's time to clean it up or shut it down.***



DR. RICK SMITH  
Executive Director  
Environmental Defence

## TOXICS DOWNSTREAM

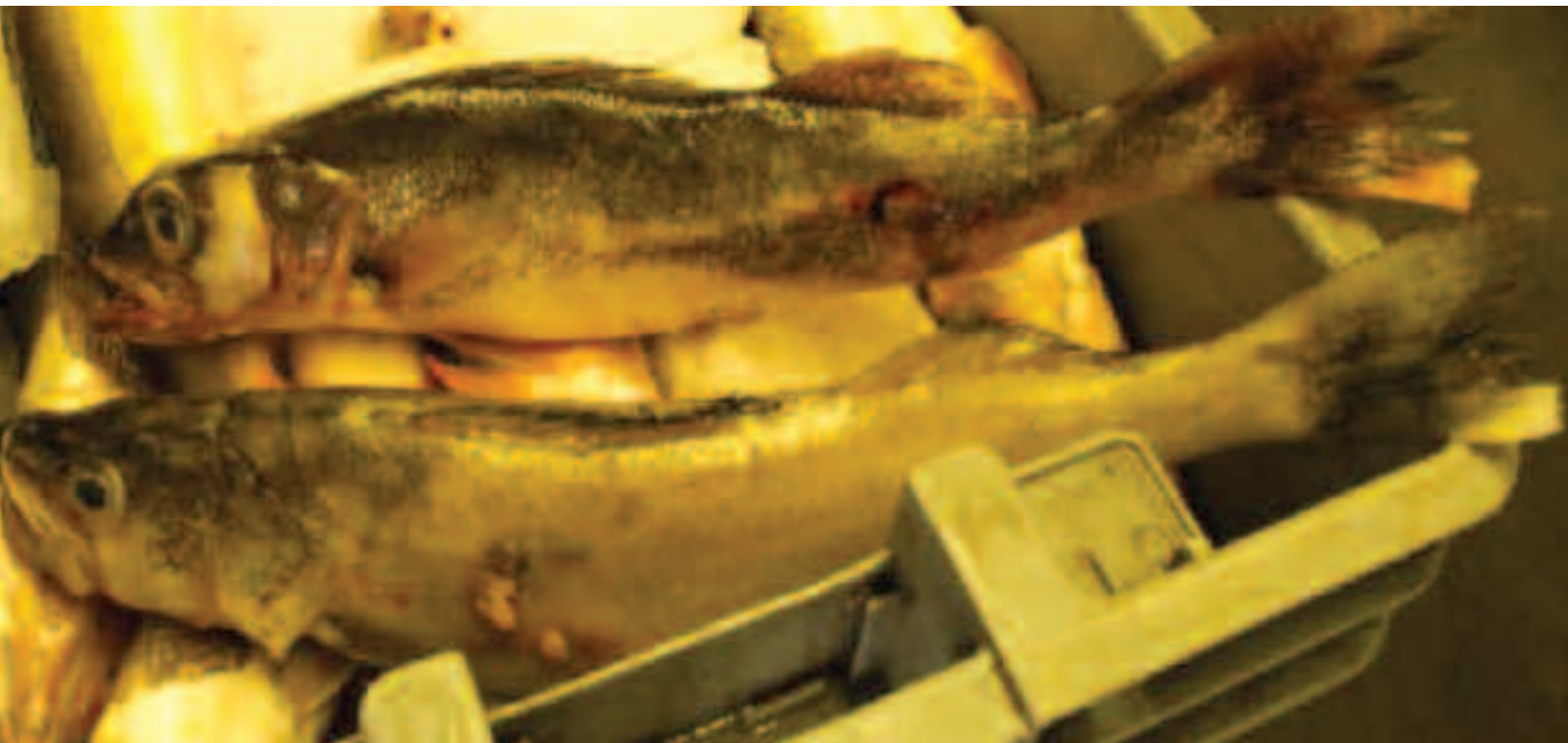
### A Giant Slow Motion Oil Spill

Toxic pollution from the Tar Sands has created what amounts to a slow motion oil spill in the region's river systems. According to leading experts, the Tar Sands may be worse in many respects than the Exxon Valdez oil spill.<sup>5</sup>

Scientists are worried since the levels of notorious carcinogens in sediments and waterways are steadily rising. First Nations downstream see the impacts first hand: "There's deformed pickerel in Lake Athabasca... Pushed in faces, bulging eyes, humped back, crooked tails... never used to see that. Great big lumps on them... you poke that, it sprays water..."<sup>6</sup>

Fish and game animals are being found covered with tumours and mutations. Some First Nations describe how fish frying in a pan smell like burning plastic. One study by a Tar Sands company concluded that arsenic could be as much as 453 times the acceptable levels in moose meat from the region.<sup>7</sup> The Alberta government responded with an assessment that arsenic levels are "only" 17 to 33 times the acceptable levels.<sup>8</sup> Both reports' estimates were well beyond the "acceptable" rate of additional cancers of 1 per 100,000 people.

The levels of toxic chemicals are already dangerously high and they are rising as Tar Sands development booms.<sup>9</sup>



→ These walleye caught in Lake Athabasca in 2007 exhibit external tumors, lesions, deformed spines, bulging eyes, abnormal fins and other defects. CREDIT: L. CAROTA, OCEAN TIDES PRODUCTIONS LTD., VANCOUVER, BC



## Poisoning People?

Not only animals and boreal ecosystems are being poisoned. Communities living downstream from the Tar Sands have seen unusual cancer clusters. A recent report for the Health Authority of one downstream community – Fort Chipewyan – found serious flaws in the monitoring programs and went on to discover dangerous and rising levels of mercury and arsenic, and raised disturbing questions about polycyclic aromatic hydrocarbons (PAHs).<sup>10</sup>

These chemicals could help explain the unusual cancers that have been cropping up in the community. For years, Dr. John O'Connor, the family doctor for Fort Chipewyan, has been growing increasingly worried about the number of cases of bile duct cancer (cholangiocarcinomas), colon cancers, lymphomas, leukemia, autoimmune diseases such as lupus, as well as thyroid cancers, overactive thyroid, and skin rashes.

Dr. O'Connor first raised the alarm when he found one of his patients had a rare form of cancer from which his own father had died. The cancer is so rare that O'Connor would not have expected ever to come across another case but now had as many as five suspected cases.

“I know a lot about it, but I never expected to see it again. Without treatment, you're dead in about a month. My dad lasted six weeks.”<sup>11</sup>

## Government Cover Up – Whistle-blower Silenced

For years, Fort Chipewyan has been trying to get the government to do something about the strange illnesses afflicting residents, but instead, government has covered up the situation. At the request of Health Canada and Alberta Environment, the Alberta College of Physicians launched investigations against Dr. O'Connor to stop him speaking out. The government of Alberta quickly produced a statistical study denying any toxic problems. The government's study did no testing for chemicals in the residents' bodies, rivers or food and did not even survey medical records of fatalities that the local doctor had diagnosed.<sup>12</sup>

Dr. O'Connor's colleagues have no doubt that government is trying to silence a whistleblower. “This is very clearly politically motivated,” says Dr. Michel Sauvé, a Fort McMurray doctor. “This is very clearly to shut him up and shut him down. In this case, [it has] clearly escalated to a level that was only because of his media criticism of the government and the callous way in which the bureaucracy was dealing with the health concerns of the community. That I think is a feeling shared among physicians for sure.”<sup>13</sup>

***“Without treatment, you're dead in about a month.”***

– DR. JOHN O'CONNOR describing the strange cancers afflicting his patients

## Negligent Oversight

Government is responsible for ensuring that development does not harm the environment or human health. But instead of properly managing the Tar Sands, government has “outsourced” monitoring to the industry itself, creating a classic situation of the fox guarding the henhouse.

Industry funds and chairs stakeholder groups that monitor environmental impacts. For water pollution, industry runs the Regional Aquatics Monitoring Program (RAMP). But as with air pollution and cumulative environmental impacts, the studies on aquatic pollution could not be better designed to ensure that no solid conclusions can be reached. The most important testing programs, such as sediment (where the toxic chemicals settle) in the Athabasca Delta, are erratic. In the most recent year of monitoring, the RAMP simply did not test in these areas at all.

In the muted language of experts, independent scientists are scornful of the monitoring programs: “As typical of previous RAMP reports, changes in methods and means of reporting undermine the utility of the results... The result is the appearance of monitoring and management of environmental concerns in the public interest. The reality is a lack of timely publicly available information and the perpetuation of business as usual,” says Dr. Kevin Timoney following a review.<sup>14</sup>

Dr. Peter Hodson of Queen’s University, a specialist in the toxic impacts of oil on aquatic ecosystems, concurs: “If you read the actual monitoring reports that have been published since 2001 ... they are pretty fractured, they are very, very difficult to read, very difficult to understand what people have actually done and what they’ve actually found. And so I think ... you’d be hard pressed to say the current monitoring effort is sufficient to answer the questions that have been raised.”<sup>15</sup>

Downstream First Nations are more blunt. The Mikisew Cree and Athabasca Chipewyan have pulled out of the industry-driven process. “[It’s] a parking lot where everything, all the major issues, are placed. Meanwhile, approvals [for new Tar Sands projects] are given,” says Mikisew spokesperson Sherwin Sheh.<sup>16</sup>

## Threatening Canada’s Boreal

The pollution pouring into the Athabasca River is already being found far downstream in the enormous Peace-Athabasca Delta.<sup>17</sup> This delta is one of the largest freshwater deltas in the world, a region of incredible biodiversity. Lake Athabasca then flows north to Canada’s largest lakes and on into Canada’s longest river, the MacKenzie, ultimately flowing into the Mackenzie Delta and Arctic Ocean. More than 1/6 of Canada drains into this watershed, which is home to many human communities as well as being one of the most important areas anywhere in the world for migratory birds and animal habitat.

The Mackenzie River Basin Board (consisting of representatives from the governments of Canada, Alberta, British Columbia, Saskatchewan, Yukon and the Northwest Territories) concluded in 2003 that “an accident related to the failure of one of the oil sands tailings ponds could have catastrophic impact on the aquatic ecosystem of the Mackenzie River Basin due to the size of these ponds and their proximity to the Athabasca River.”<sup>18</sup>

But the Boreal need not wait for a tragic accident. The Exxon Valdez experts have alerted us: the giant slow motion oil spill is already in the waterways. And it is getting worse.



**“Elders tell us water is the boss, and without clean water we wouldn’t exist. Now the boss is in trouble and needs our help.”**

– COUNCILLOR WILLIS FLETT, Mikisew Cree First Nation, living downriver from the Tar Sands

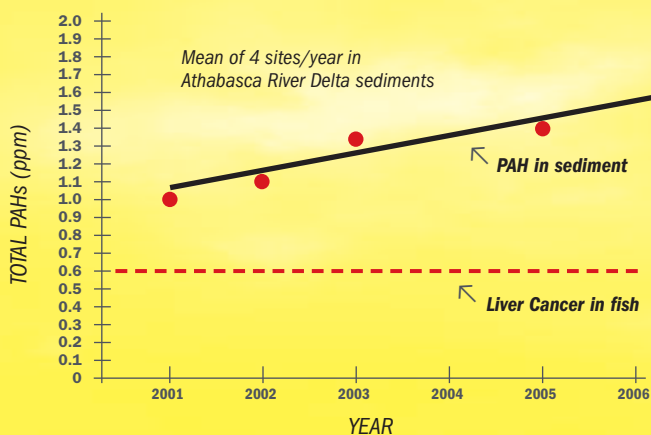
Credit: M. Price

## The Science of Tar Sands Pollution

The Tar Sands generate a number of toxic chemicals. Of primary concern are naphthenic acids, mercury, arsenic salts and PAHs. The levels found by independent scientists already present a toxic hazard to humans and wildlife. But even more disturbing is the fact that they are rising.<sup>19</sup>

Scientists have learned a great deal about PAHs in recent years, particularly as a result of research following the Exxon Valdez oil spill.<sup>20</sup>

We now know that waterborne PAHs are toxic to embryonic fish at concentrations as low as 1 part per billion (ppb).<sup>21</sup> Looking at sediment concentrations, even the RAMP has found mean concentrations of PAHs in sediments to be rising from 1 ppm (part per million) in 2001 to 1.4 by 2005 as far downstream from the Tar Sands as the Athabasca delta.<sup>22</sup>



→ **PAH concentrations in Athabasca River Delta sediments are dangerously high and on the rise.**

CREDIT: PAH DATA COURTESY TIMONEY, 2007. LIVER CANCERS IN FISH THRESHOLD FROM MYERS, 2003

There are no Canadian guidelines for sediment concentrations of total PAHs. But we know that the sediment levels of total PAHs in the Athabasca Delta are double the threshold known to cause liver cancers in fish.<sup>23</sup> As long ago as the 2001 RAMP report, the authors had determined that “Sediments from the lower Athabasca River, including Athabasca Delta, were found to be toxic to several species of invertebrates.”

Industry often argues that toxic chemicals occur naturally in the region and not as a result of Tar Sands development. But in fact, the levels are on the rise. Dr. Timoney’s study for the Ft. Chipewyan community’s Health Authority compared present day findings to public data available from the 1970s-1990s. The findings are frightening:

- *Mercury levels (total mercury in sediments) are as much as 98% higher in parts of the Athabasca delta over the historical medians.*
- *Dissolved arsenic levels have jumped as much as 466%.*
- *Sediment arsenic levels have increased as much as 114%.*
- *Alkylated PAH levels in sediments have risen as much as 72% above the historical means in some areas.<sup>24</sup>*

As with all things related to the Tar Sands, these rising levels of poisonous chemicals are just the beginning. If the arrangement between the Canadian and US governments becomes reality, the Tar Sands will be five times bigger in short order. The toxic toll will be staggering.

***The largest dam in the world is a toxic sludge reservoir behind one of Syncrude's earthen dykes.***

## **TOXICS ON SITE**

### **A Toxic Mooncape**

The Tar Sands are becoming world famous for images of the massive toxic tailings ponds filled with acutely toxic chemicals. To describe them as “ponds” however, is to be guilty of understatement. These masses of toxic soup have now grown so big that they can be seen by the naked eye from space. Indeed, they now include the largest dams on the planet, to be rivalled only by China's Three Gorges when it is finished. It is hard to believe, but one of the largest dams in the world is a toxic sludge reservoir behind one of Syncrude's earthen dykes.<sup>25</sup>

These tailings ponds are often built on the banks of the Athabasca River and held in place only by earthen dykes. These mines and tailings ponds are being built in a boreal forest ecosystem dominated by water. Indeed, more than 50% of the region is water in the form of lakes and creeks, marshlands and fens and of course, groundwater.

The toxic chemicals from the processing of the Tar Sands are released into this wetland environment. Huge pipes disgorge toxic sludge 24/7 into open air tailings ponds, which then seeps into the rivers and groundwater systems. The toxicants are so concentrated that birds can die by landing at the tailings ponds. Some companies have hired workers to rake the dead birds off the ponds; most sites use propane cannons and scarecrows intended to frighten birds away. These tailings ponds are acutely toxic. Like all tailings ponds, they leak into the river systems. Suncor admitted in 1997 that its Tar Island Pond leaks approximately 1,600 cubic metres of toxic fluid into the Athabasca River every day.<sup>26</sup> The tailings ponds are growing constantly and already cover more than 50 square kilometres.<sup>27</sup>



→ **Tar Sands strip mining.** CREDIT: GARTH LENZ

Canada's National Energy Board has warned that: "the principal environmental threats from tailings ponds are the migration of pollutants through the groundwater system and the risk of leaks to the surrounding soil and surface water.... the scale of the problem is daunting and current production trends indicate that the volume of fine tailings ponds produced by Suncor and Syncrude alone, will exceed one billion cubic metres by the year 2020."<sup>28</sup>

Toxic chemicals are seeping into waterways and the ponds themselves are a mega-disaster waiting to happen. Tailings dykes fail with disturbing frequency. The International Commission on Large Dams tracks major failures worldwide and finds that "Unfortunately the number of major incidents continues at an average of more than one a year. During the last 6 years the rate has been two per year."<sup>29</sup>

An earthquake or a severe weather event could be fatal to the downstream environment. "If any of those tailings ponds were ever to breach and discharge into the river, the world would forever forget about the Exxon Valdez," predicts Professor David Schindler, one of the world's pre-eminent water scientists.<sup>30</sup>

## **Negligent Monitoring**

With government outsourcing monitoring to industry, the Canadian public and environment are at risk. Consider just one example of industry's implausible conclusions. When Syncrude presents its research report, the company asserts that "Overall, produced waters are relatively benign."<sup>31</sup> This conclusion follows their own findings that the waters are "acutely toxic," that their "High solubility and low adsorption result in export from reclaimed areas to off-site aquatic environments," that they are "toxic to many biota" and that there are measurable "dyke seepage waters."<sup>32</sup>

**According to leading experts, the Tar Sands may be worse in many respects than the Exxon Valdez oil spill.**

There is no monitoring at all of the toxic chemicals travelling through groundwater. This, despite the fact that, as Canada's National Energy Board has said, groundwater is the most obvious pathway for Tar Sands poisons to travel throughout the environment and into the major waterways.<sup>33</sup>

With a tone of exasperation that so many years have passed without action, the federal Parliament's Standing Committee on Natural Resources has called on all government agencies to "step up research in order to: determine the true impact of oil sands activity on the Athabasca River ecosystem, as well as on Aboriginal fisheries in the Peace and Athabasca river delta."<sup>34</sup>

***"If any of those tailings ponds were ever to breach and discharge into the river, the world would forever forget about the Exxon Valdez."***

– PROFESSOR DAVID SCHINDLER, one of the world's pre-eminent water scientists

## **Implausible Reclamation**

The Tar Sands companies say that they intend to dig up the oil and then return the region to its original state before leaving. Anyone who has visited the region can see for themselves how implausible this public relations message really is. From horizon to horizon, the Tar Sands have created a toxic moonscape of strip mines and tailings ponds. When industry is finished digging out the oil, it will leave. And as we know from similar operations in other parts of the country, Canadians will be left with the toxic legacy.

Consider the liabilities cost to the taxpayer just of the relatively small Sydney Tar Ponds, in which 31 hectares were poisoned by 700,000 metric tonnes of contaminated sediments. Government recently committed \$400 million in taxpayers' dollars to a cleanup. Contrast these 31 hectares with Canada's Tar Sands where the tailings ponds alone already cover more than 5,000 hectares<sup>35</sup> and grow with every passing moment.

No environmentally viable plan exists for Tar Sands reclamation and industry is still studying the options for clean up even while the problem mounts. The leading proposal is to "bury" the worst of the toxic tailings under freshwater and to create an artificial series of creeks and ponds flowing to "end-pit lakes" which, it is hoped, will filter toxic chemicals and allow them to settle to the sediments.

Science clearly shows Tar Sands "reclamation" to be a fantasy. The necessary studies are not being done and those that are show serious toxic effects. For example, scientists have already found that "wetlands formed from oil sands effluent will not support viable amphibian populations."<sup>36</sup> The same is true for birdlife.<sup>37</sup> And the effects on mammals (e.g. humans) are unstudied.<sup>38</sup>

## TOXICS DOWNWIND

*The Tar Sands are already a significant source of dangerous air pollution – a situation that will get much worse should Tar Sands expansion continue to proceed without government forcing industry to clean up.*

*There are many kinds of air pollution from the Tar Sands. We will focus here briefly on two main areas – the benzene, and acid rain.*

### **Emissions Exploding**

Tar Sands workers and local residents don't have the option of holding their breath in the summertime, but it might otherwise be recommended. The summer heat releases thousands of tonnes of volatile organic compounds (VOCs) from the exposed tailings ponds, including large amounts of benzene.

Benzene is a human carcinogen for which long-term exposure can result in leukemia, a potentially fatal cancer of the blood-forming organs. It is a “non-threshold” pollutant, meaning that there is a risk of harm at any level of exposure.

Environment Canada estimates that Tar Sands releases of benzene are now about 100 tonnes per year, and could grow to 500 to 800 tonnes per year by 2015.<sup>39</sup>



→ Tar Sands toxic ponds are already visible from space. CREDIT: GARTH LENZ

As for the broader category of VOCs that contains other dangerous chemicals, the Tar Sands released 63,000 tonnes in 2006, and this could grow to 200,000 tonnes per year by 2015 based on current trends.<sup>40</sup>

The Government of Canada is contemplating new regulations for various air pollutants, including VOCs. Incredibly, these proposals would sanction a 60% growth in VOCs from the Tar Sands by 2015.<sup>41</sup> The Government is considering a future cap on benzene for the Tar Sands, but in a clear double standard it is already pressing ahead with regulating benzene from the natural gas, iron and steel sectors.<sup>42</sup>

## **Raining Acid on Saskatchewan**

When Canada's former Environment Minister Rona Ambrose started her job, she was warned by her staff about "growing concern about the potential for acid rain impacts in Western Canada due to expected increases in acidifying emissions from industrial sources."<sup>43</sup>

It is well known that Alberta is polluting itself,<sup>44</sup> but what is less well known is that Alberta is increasingly polluting other provinces too. Studies have estimated that 70% of the sulphur entering Alberta's airshed is transported into Saskatchewan.<sup>45</sup>

Acid rain is the result of interactions between sulphur oxides, nitrogen oxides and water. The pollutants that cause acid rain can travel hundreds or even thousands of kilometres.<sup>46</sup> Environment Canada estimates that the current rates of acid forming pollution from the Tar Sands are 158,000 tonnes per year for sulphur oxides and 76,000 tonnes per year for nitrous oxides.<sup>47</sup>

At a Saskatchewan site 200 kilometres downwind of the Tar Sands, the mean level of acid in precipitation increased in the past 12 years, sliding from pH 5.3 to 4.1. Normal rainfall has a pH of 5.6.<sup>48</sup>

In 2005, Saskatchewan Environment ran a network of 10 monitoring stations in the northwest of the province – across from the Tar Sands – and found build up of nitrogen from Alberta.<sup>49</sup>

Northern Alberta, Saskatchewan, Manitoba and the NWT are particularly susceptible to acid rain because many of these lakes and soils rest on granite bedrock that lacks the alkalinity that is a natural defence against acid rain.

Acid rain affects lakes, rivers, soils, forests, buildings and human health. In rivers and lakes, acid deposition exacerbates the conversion of mercury to the more dangerous form of methyl-mercury that can be taken up by fish.<sup>50</sup>

A study of Quebec forests showed a 30% decline in growth rate of hardwood and coniferous stands in areas where acid rain was serious between the 1970s and 1990s.<sup>51</sup> Lakes with a lower pH lose sensitive species, such as some species of minnows that serve to feed larger fish and water birds.

There are small but significant associations between acid in the air and respiratory symptoms, impaired lung function, hospital admissions, and premature mortality.<sup>52</sup>

In 2006, Alberta and Saskatchewan began meeting to discuss acid rain from the Tar Sands. But, because Saskatchewan is moving to exploit its own Tar Sands deposits, it is unclear whether it will make a serious effort to protect its northern people and ecosystems from acid rain caused by Alberta.



## TOXICS DOWN THE PIPE

*Because bitumen and synthetic crude is piped far away from the Tar Sands for processing, the toxic impacts of the Tar Sands affect people hundreds and even thousands of kilometres away. This makes the toxic impacts of the Tar Sands a North American problem.*

### Alberta's Sacrifice Zone – Upgrader Alley

Oil from the Tar Sands is not initially in liquid form like oil found elsewhere. The thick bitumen must first be “upgraded” into synthetic crude before it gets refined into end products like gasoline or jet fuel.

Some of this upgrading occurs at Tar Sands operations themselves, adding to the pollution created on site. Increasingly, however, bitumen is piped south to Edmonton or into the US.

Shell built the first upgrader northeast of Edmonton, and there are two more under construction and up to 10 more in various stages of development, earning the area the nickname “Upgrader Alley.”<sup>53</sup> In 2006 the one Shell upgrader alone reported releases of over 6,000 tonnes of sulphur dioxide, 850 tonnes of nitrous oxides, 200 tonnes of VOCs.<sup>54</sup>

This does not include “fugitive” or unplanned emissions that can also be significant in quantity. Facilities are also at risk for dangerous accidents such as the one that took place in November of 2007 at the Shell facility.<sup>55</sup> In case of emergencies, local residents may have to evacuate or ‘shelter in place’ – staying indoors and sealing a small room with duct tape or wet cloths until chemicals in the air dissipate.<sup>56</sup>



→ **Sarnia is already heavily polluted but is targeted for even more Tar Sands refining.**

CREDIT: R. PLAIN

In 2005 and 2007, an independent and prize-winning air pollution specialist studied the area and found that existing levels of pollution already rival the most polluted cities in China.<sup>57</sup> This included elevated levels of benzene near the Shell complex that should be of concern to employees there. The results disputed the conclusions from industry air monitoring for the area.

The sheer concentration of so many toxic facilities in one place has created a sacrifice zone for human and environmental health. Environmental Assessments prepared for the companies proposing these projects acknowledge that air pollution already exceeds health guidelines for a range of substances and that their emissions will just make things worse.<sup>58</sup>

In 2005, existing facilities in the area produced 19,000 tonnes of nitrogen oxide and 20,100 tonnes of sulphur dioxide. In October 2007, the province proposed airshed targets of 25,000 tonnes of nitrogen oxide and 28,000 tonnes of sulphur dioxide per year, a growth in emissions for an already polluted area.<sup>59</sup> And if experience is any guide, companies may be able to incur a financial penalty to exceed these limits.

***An independent and prize-winning air pollution specialist studied the area and found that existing levels of pollution already rival the most polluted cities in China.***

## **“Supertankers” on BC’s Coastline**

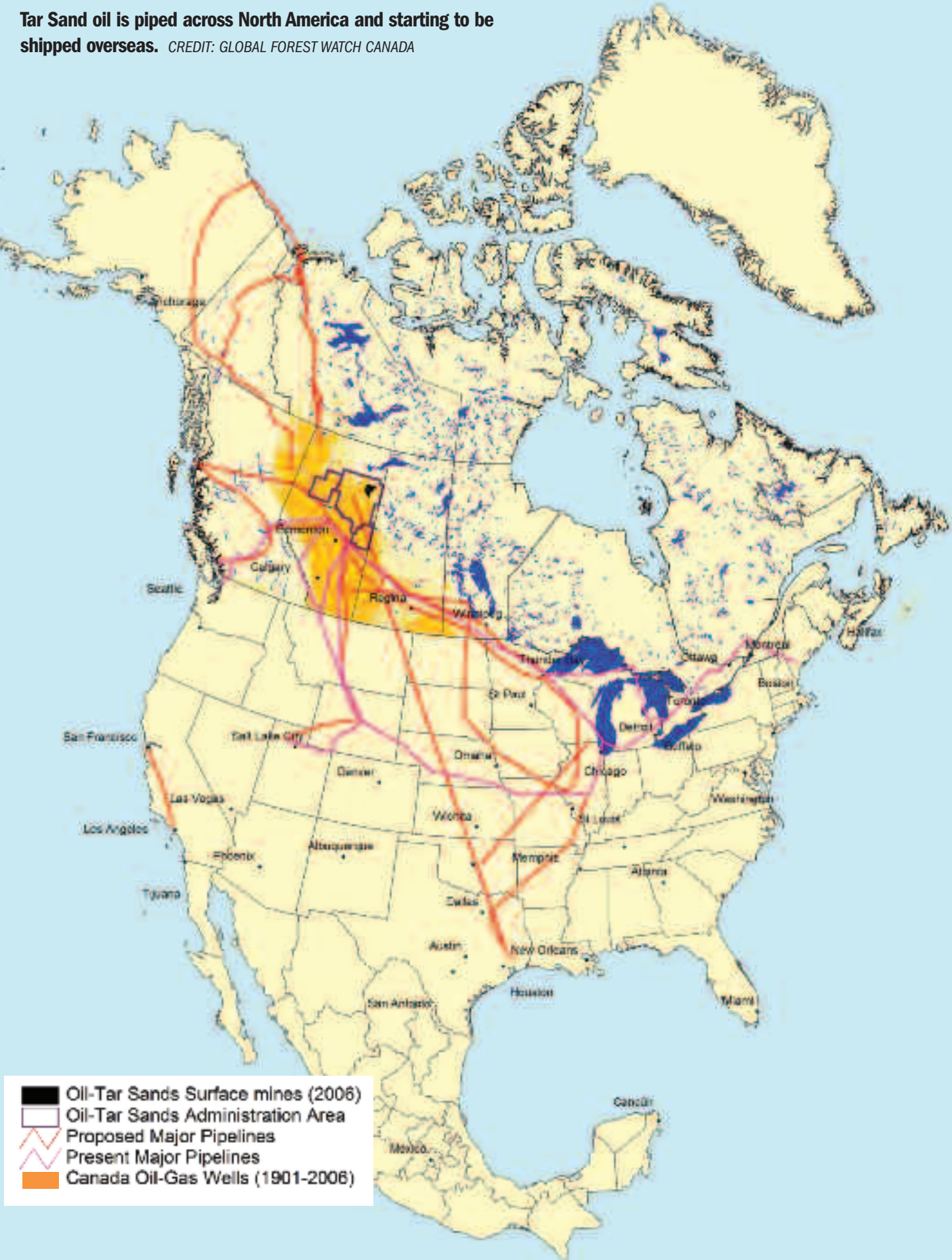
While victims of the Exxon Valdez oil spill continue to fight Exxon in court for damages 20 years after the disaster, a new threat to the coastline is emerging. Enbridge wants to build a pipeline from the Tar Sands to the northern BC coast in order to serve the Asian marketplace. The pipeline could carry Tar Sands oil to tankers so big that one is like “a jumbo West Edmonton mall.”<sup>60</sup> The project still faces significant First Nations legal hurdles.

Albertan oil is already traveling through BC waters, though. The number of tankers loading at the Burnaby Westridge Terminal has gone from none in 2000 to 34 in 2007. Kinder Morgan is in the midst of expanding its pipeline to Burnaby from 260,000 to 300,000 barrels per day.

## **Ontario’s Chemical Valley**

The area around Sarnia is known as Canada’s “Chemical Valley” because of its concentration of large polluting industry. Despite being thousands of kilometres from the Tar Sands, the negative impacts are felt even here.

**Tar Sand oil is piped across North America and starting to be shipped overseas.** CREDIT: GLOBAL FOREST WATCH CANADA



At 70,000 barrels per day, the Suncor Sarnia refinery that processes Tar Sands oil is the fourth largest polluter in the region, sending out over 10 million kilograms of toxic air pollutants in 2005.<sup>61</sup> But, the Suncor refinery is ranked number one in the region in terms of the chemicals released that are known or suspected to be reproductive or developmental toxicants.<sup>62</sup>

The Aamjiwnaang First Nation in Chemical Valley is experiencing disturbing impacts from the pollution as twice as many girls are being born as boys. Moore Township next to the reserve is also experiencing a lower male birth rate, and scientists have found evidence of “feminized” turtles in the St. Clair River that runs through the area.<sup>63</sup> It is not known, however, what exactly is causing these results, and many types of heavy industry exist there.

Shell is building a new refinery for Tar Sands oil in the Sarnia area that will be two to three times bigger than the Suncor plant, thereby significantly adding to the pollution in the area.

## **Exporting Toxics to the USA**

Refineries for Tar Sands oil are also exposing Americans to toxic substances. A high-profile battle is underway because of plans by BP to expand its refinery in Whiting, Indiana to process more Tar Sands oil. Already one of the biggest polluters of Lake Michigan, the refinery received permission from the State of Indiana to increase ammonia emissions by a half and solids by a third.

Chicago Mayor Daley is opposed: “Our great resource is Lake Michigan. Our drinking water – the whole idea of quality of life: both the lake and the river,” he says. “That is our front door, back door... The idea of dumping now into the lake again is really unacceptable.”<sup>64</sup>

BP promised to go ahead with the expansion while adhering to pre-expansion pollution levels, but admits that it does not know how to do this, nor has it been willing to give up its new higher pollution permits.<sup>65</sup>

In South Dakota, Hyperion Resources is moving ahead with plans to build the first new refinery in the US since 1976 – this one sourcing Tar Sands oil and nicknamed “the Gorilla project” for its huge size of 400,000 barrels a day, which would be the sixth largest refinery in the United States. The company wants to site the refinery in an economically depressed area where the jobs will be welcomed, and has even billed the project as “green” but without saying how much pollution will go into surrounding air and water, and also not talking about the destructive nature of the Tar Sands themselves.

In the spring of 2007, Husky Energy bought a refinery in Lima, Ohio to convert to processing Tar Sands oil, following a deal between EnCana and ConocoPhillips in 2006 to gain access to three of Conoco’s US refineries for Tar Sands oil.<sup>66</sup> In December 2007, Husky also partnered with BP to process Tar Sands oil in a Toledo, Ohio refinery.<sup>67</sup> Tar Sands oil is already being processed in Commerce City, CO, Rosemont MI, Toledo, OH, Superior WI, and Warren, PA.<sup>68</sup>

**“The idea of dumping now into the lake again is really unacceptable.” – Chicago Mayor Daley**

## A TOXIC FUTURE – TAR SANDS AND GLOBAL WARMING

By now, the litany of dire impacts we face due to unchecked global warming are well publicized.<sup>69</sup> Suffice it to say we face a challenge to the very foundation of modern civilization. In this context, the Tar Sands can be seen as a ticking carbon time bomb.

### Reverse Alchemy – From Gold to Lead



→ The Carbon Dioxide Information Analysis Center lists 207 nations by order of carbon emissions. The Tar Sands has higher emissions than 145 of them.

FIGURES NOT INCLUDING land use change/forestry; SOURCE: UN FRAMEWORK CONVENTION ON CLIMATE CHANGE, WORLD RESOURCES INSTITUTE, US DEPARTMENT OF ENERGY'S CARBON DIOXIDE INFORMATION ANALYSIS CENTER.

The Tar Sands are ground zero for global warming for two main reasons. First, it is the fastest growing source of new greenhouse gas emissions in Canada. Tar Sands emissions – not counting burning the oil later – are estimated at about 40 million tonnes for 2007,<sup>70</sup> but if left unchecked this could explode to 142 million by 2020.<sup>71</sup> To put that in perspective, that growth would be the equivalent of wiping out all of Ontario's promised greenhouse gas cuts by 2020.<sup>72</sup>

The main reason is that extracting the oil from the sand is so energy intensive, from the large machines to the natural gas used to melt the bitumen out of the sand. It is estimated that by 2012 the Tar Sands will use as much gas as is needed to heat all the homes in Canada.<sup>73</sup> Getting this gas will require building new pipelines and drilling in wilderness areas like the Mackenzie Valley, and building new facilities to import liquefied natural gas to cover the shortfall since Canada's own gas production is projected to decline starting now.<sup>74</sup>

Using huge amounts of relatively clean burning natural gas in order to produce dirty and carbon-heavy oil is what commentators have dubbed “reverse alchemy” – the equivalent of turning gold into lead.<sup>75</sup> The absence of a Canadian energy strategy means that the Tar Sands could suck up all that remains of our natural gas, leaving Canadians with fewer options for powering our future more cleanly.

### Canada's Failed Climate Politics

The second reason the Tar Sands is ground zero for global warming is the political dynamic they set up for the rest of Canada. Because our federal political leaders refuse to put real caps on greenhouse gasses for the Tar Sands, they thereby refuse to put real caps for the rest of industry in Canada.

In this way, the rest of Canada's progress on global warming is being held hostage by the Tar Sands.

To create the appearance of doing something, the Canadian government has fallen back on issuing "intensity" targets that cut emissions per unit of production, but allow overall emissions to rise as production rises. This is tailor-made to give the Tar Sands producers the loophole they need to profit from global warming.

The Government of Canada estimates that its "intensity" system will allow Tar Sands emissions to grow to 75.5 million tonnes in 2020, which is almost a doubling of current emissions.<sup>76</sup> If we believe that number – remembering that there's no actual cap – that would mean that the Tar Sands alone would wipe out all of the emissions cuts promised by BC by 2020.<sup>77</sup>

And of course, this is if the government's 2020 target is met. Virtually every independent analyst from the CD Howe Institute to the Deutsche Bank has concluded that Canada will not even meet its new watered down emissions targets,<sup>78</sup> let alone meet targets that scientists tell us are needed to avoid the most dangerous impacts of global warming.

Most perversely, Tar Sands companies may actually be paid for their emissions growth. According to the Tyndall Centre for Climate Research, Tar Sands companies could earn between \$30 million and \$700 million from selling carbon credits based on reduced greenhouse gas emissions per barrel of oil, while their actual global warming emissions double or triple. This is because the federal government's proposed rules for large polluters are set at a level that is less demanding than what has already been voluntarily committed to by some companies.<sup>79</sup>

## **Canada's progress on global warming is being held hostage by the Tar Sands.**

### **A Tar Sands Tax**

There are signs that the leadership vacuum created by the federal government's weak climate change policies will be filled by other governments.

Pioneered in California as part of Governor Schwarzenegger's battle against global warming, the Low Carbon Fuel Standard (LCFS) will require sellers of transportation fuels to cut the carbon content of their fuels by at least 10% by 2020, taking the life cycle of production of fuels into account.<sup>80</sup>

A life cycle approach is important because deriving a barrel of Tar Sands oil causes as much as three times the greenhouse gas pollution as a regular barrel of oil.<sup>81</sup> California's fuel importers will therefore need to steer clear of Tar Sands oil or face penalties. In this way, other jurisdictions are moving towards a Tar Sands tax because of Canada's failure to act.

Over a dozen US states are considering a LCFS, as is the European Union and BC and Ontario.<sup>82</sup> In December 2007, the US passed energy legislation that requires US government agencies to source fuel that has the same or less emissions on a life cycle basis as regular petroleum.<sup>83</sup> In May 2007 Presidential candidate Barack Obama introduced LCFS legislation in the US Senate, setting the stage for its potential adoption by the United States as a whole.<sup>84</sup>

## Taking Responsibility

Tar Sands companies know how to capture and store their carbon emissions underground or under the sea. The technology exists. They aren't doing it because it's more profitable to use the atmosphere as a free waste dump until the Canadian government requires them to stop.



In December 2007, a coalition of Tar Sands companies and other major polluters released a report on carbon capture and sequestration that estimated costs for new gasification plants to make hydrogen for upgraders at \$45 per tonne of avoided CO<sub>2</sub> and \$80 per tonne to retrofit existing plants.<sup>85</sup>

The industry coalition itself points out<sup>86</sup> that currently envisioned regulated requirements to reduce emissions – “industry’s contribution” – gets only a small part of the way to the key \$80 threshold (that declines to \$60 over an undefined time period), with the implication that public subsidies are needed to close the gap.

An example of such subsidies can be found in the \$156 million given to Alberta by Canada in March 2007, which may go in part towards carbon capture and storage development.<sup>87</sup>

A better way to close the gap for carbon capture and storage is through an effective federal government climate strategy. A hard cap on emissions from the tar sands would lead to companies having to figure out carbon capture and storage without public subsidies, or forego future operations. Alternatively, a higher price on carbon would also close the gap more quickly. The National Round Table on the Environment and the Economy recently recommended establishing a strong and clear price signal on emissions in Canada, and explored figures of \$60 per tonne by 2020 and over \$150 per tonne by 2025.<sup>88</sup>

→ **The Tar Sands are Canada's fastest growing source of greenhouse gas pollution.** CREDIT: S. JOCZ

The Tar Sands industry can afford it. Oil is now flirting with the \$100 per barrel mark, opening up a large profit margin for all oil companies, including Tar Sands operators who face relatively higher costs. In 2006 Suncor made \$3 billion<sup>89</sup> and Canadian Oil Sands Trust that owns just over a third of Syncrude made \$834 million.<sup>90</sup> Clearly, Tar Sands companies can internalize the carbon cost they are currently inflicting on the planet and still operate.

## TOXIC ENFORCEMENT

*If you read the 2007 Kearl Tar Sands decision from the Canadian Environmental Assessment Agency,<sup>91</sup> you'll find signs of bureaucrats panicking. This could be why that decision ended up in court.*

*It must be asked how the Tar Sands is allowed to release so much toxic pollution under Canadian law. The answer is that Canadian laws are not being enforced. Instead, Canadian officials rely on industry-led monitoring and an ineffectual provincial system.*

*There are two main Canadian laws that should be preventing Tar Sands pollution, the FISHERIES ACT and the CANADIAN ENVIRONMENTAL PROTECTION ACT. There is also the CANADIAN ENVIRONMENTAL ASSESSMENT ACT process that exists to review major projects like the Tar Sands.*

### **Fisheries Act**

On paper, the *Fisheries Act* is one of Canada's strongest environmental laws because it suffers less from the vagueness and discretion built into other legislation.

Section 36 of the *Fisheries Act*, for example, prohibits putting harmful substances in water with fish in it. So why under the *Fisheries Act* are PAH levels allowed to rise in the Athabasca River?

The main issue is that the Canadian government is turning a regulatory blind eye to the fact that the pollution enters the river not through direct discharge by Tar Sand operators, but indirectly through groundwater seepage, surface runoff and through wind carrying dirty sand into the river.

This is not to say that Canadian officials deny the existence of Tar Sands pollution and its impact on fish. Indeed, during environmental assessments, Canadian officials often express concern over pollution and point out that adequate water quality objectives and monitoring do not exist for Tar Sands related toxic discharges.<sup>92</sup> Canadian officials also acknowledge the issue of "fish tainting" – or, less politely put, the contamination of fish by Tar Sands pollution.<sup>93</sup>

Yet, rather than enforce the law, Canadian officials instead rely on the weak Alberta government permitting process, and recommend more research and monitoring in place of actually upholding their duty to stop toxic substances entering the Athabasca. The result? Steadily growing pollution in the river.



## **Canadian laws are not being enforced. Instead, Canadian officials rely on industry-led monitoring and an ineffectual provincial system.**

### **Canadian Environmental Protection Act**

The Canadian government calls CEPA “the cornerstone legislation for preventing pollution in order to protect Canada’s environment and the health of Canadians.”<sup>94</sup> CEPA allows the Canadian government to designate a substance as “toxic” and thereby to regulate it. The law could therefore be a very powerful tool for cleaning up the Tar Sands.

The problem, though, as with many Canadian laws, is that discretion is left in the hands of government as to what substances earn this designation and what kinds of regulations then result, if any. For example, while there are tens of thousands of toxic substances that are harmful to human health, only a few dozen so far make Canada’s list for action.

In 1999 and 2002, Canada’s independent Environment Commissioner reviewed the performance of the Government of Canada under CEPA and found performance wanting. In 2002 she stated: “The processes we observed seem to defy timely, decisive, and precautionary action...We are leaving our children the responsibility of assessing, and certainly of managing, toxic substances in use today.”<sup>95</sup>

With regards to the Tar Sands, any influence CEPA has had to date has been indirect. Rather than regulate directly, the choice of the Government of Canada has been to work with the provinces to establish voluntary “standards” on certain pollutants.

The problem with these measures is that they are not binding and do not result in legal consequences if they are not met.<sup>96</sup> Alberta is therefore free to set its pollution limits as weak as it wants to in order to encourage Tar Sands companies. In April 2007, the Canadian government announced that it would begin to use CEPA to directly regulate air pollutants.<sup>97</sup> As seen with the example of VOCs and benzene in the Toxics Downwind section, however, the approach does not begin from a place of asking what healthy people and ecosystems need, but rather from the place of asking what the Tar Sands industry needs and setting caps based on that.

The new CEPA air pollution regulations are currently out for consultation. They will not be in place before 2012.

The Canadian government has also initiated a new Chemicals Management Plan under CEPA. But chemicals associated with petroleum production have been hived off into their own stream, with few public details of how this assessment will unfold.<sup>98</sup>

### **Canadian Environmental Assessment Act**

The *Canadian Environmental Assessment Act* (CEAA) is supposed to ensure that major projects do not cause significant environmental impacts.

To date, all five Tar Sands decisions that have gone to CEAA Joint Panels (Canada with Alberta) have been declared “not likely to cause significant adverse environmental effects.” This is an incredible conclusion to anyone who has seen a Tar Sands mine from the air. The latest decision, however – the Kearl/Imperial Oil decision – stated:

“With each additional oil sands project, the growing demands and the absence of sustainable long-term solutions weigh more heavily in the determination of the public interest.”<sup>99</sup>

**“With each additional oil sands project, the growing demands and the absence of sustainable long-term solutions weigh more heavily in the determination of the public interest.”**

– KEARL/IMPERIAL OIL decision

Environmental organizations have sued to overturn this decision in part because the Joint Panel acknowledged that the multi-stakeholder monitoring and management bodies are demonstrably not working, yet it nonetheless continued to rely on these bodies to justify the approval. The Joint Panel wrongly accepted that these failing bodies will somehow figure out and in some cases invent mitigation measures when it should have required such measures be in existence and effective now.<sup>100</sup>

The Joint Panel decisions shed light on the fact that regulators know about the negative impacts of the Tar Sands, but are not using their regulatory tools to address them. For example, in the Kearl hearings Environment Canada recommended better controls on emissions from machinery to control nitrous oxides and particulate matter, but this was rejected by both the oil company and the Joint Panel.<sup>101</sup>

With regard to water quality, Environment Canada stated that it was concerned that due to the extent of development, water quality could be adversely affected to a greater degree than predicted. It also again requested site- or region-specific water quality objectives for toxics for which provincial objectives do not exist,<sup>102</sup> but has not moved to require this through the *Fisheries Act* permitting, despite being able to do so.

It will be interesting to watch whether the next Joint Panel on a Tar Sands mine will conclude that a project will not have significant adverse impacts. It is increasingly evident that the negative impacts of the Tar Sands are not being contained and that the regulators are not doing their job. The charade cannot go on forever.

## Alberta Law

The federal government has largely deferred to Alberta on Tar Sands management since natural resources fall within provincial jurisdiction. Environmental protection, however, is a shared responsibility, which is why federal laws should apply, particularly due to the trans-boundary nature of Tar Sands pollution.

To expect that Alberta's legal framework will ensure environmental protection in the Tar Sands would be misguided. Alberta continues to lead the battle against meaningful greenhouse gas caps in Canada and has a culture of resisting environmental progress. For example, Alberta's energy regulator was recently caught spying on people opposed to an electricity line,<sup>103</sup> and its politicians continue to claim that it is a leader in protecting the environment, even when the evidence is firmly to the contrary.<sup>104</sup>

Alberta's main pollution legislation – the *Environmental Protection and Enhancement Act* – relies heavily on “objectives” and “codes of practice” instead of mandatory limits. Like Canada's federal government, Alberta has largely ceded environmental management of the Tar Sands to the industry-led multi-stakeholder bodies in Fort McMurray.

# CONCLUSION

## Clean It Up Or Shut It Down

While it is a stretch to believe the Tar Sands can ever be truly sustainable, there is much that can be done to clean it up. Technology either currently exists or is close to commercialization that can mitigate many of the worst impacts. The challenge is finding the political will in the Government of Canada and Alberta to require industry to make meaningful progress. New Tar Sands approvals should wait until these kinds of reform elements are implemented:

- **Pass a real carbon cap.** The federal government's flawed "intensity" caps will ensure that Tar Sands emissions grow, not shrink. Hard caps need to be put immediately on Tar Sands emissions, and compliance with those caps must set a price on carbon that has industry pay at levels that result in the deployment of carbon capture and storage no later than the next few years.
- **Use dry tailings.** Tar Sands waste can be put in a dry form rather than into wet tailings ponds that leach pollution into the groundwater and are the source of VOC emissions. Dry tailings would also reduce water withdrawals from the Athabasca River. Care must be taken, though, to cap dry tailings to avoid wind erosion.
- **Require wildlife offsets.** By their very nature, Tar Sands operations cannot be made friendly to wildlife and ecosystem protection, so governments must compensate for this loss by creating new protected areas that serve to protect the species in the area.
- **Clean up refineries and upgraders.** Facilities should not be so concentrated in an airshed as to pose a danger to human health. Refinery workers and nearby residents must be protected by mandating facilities that capture pollutants at the highest possible level, use only ultra low nitrogen oxide burners, use gas-tight fittings on all connections, and that pay for truly independent monitoring at fence lines and in a five-mile grid.
- **Ensure Aboriginal control and benefit.** Aboriginal Rights and Title exist in areas affected by the Tar Sands, both near and far. These legal obligations must be respected through meaningful control by First Nations over Tar Sands operations from the disposition to the reclamation and monitoring phases. First Nations must also financially benefit from Tar Sands operations that affect the exercise of their traditional rights.
- **Have federal regulation and independent monitoring.** The reliance on monitoring as a substitute for regulation must end. Science-based limits must be placed by the Canadian government on all environmental aspects of Tar Sands operations – air, land and water – and aggressive enforcement actions taken by government in case of violations of these limits. Monitoring to ensure compliance must be arms-length from industry, run by independent scientists, with results available to the public.

Should the government not move to require implementation of these measures to clean up the Tar Sands, then operations should be shut down. We should begin by shutting down the most destructive projects – the strip mines – and then shut down other projects that fail to meet modern environmental expectations.

The Athabasca hydrocarbon deposit isn't going anywhere. It should remain safely underground until such time as humans are willing to develop it responsibly.

## Sources

- 1 “The Climate Implications of Canada’s Oil Sands Development,” the Pembina Institute, November 29, 2005  
2 <http://www.cbc.ca/canada/story/2007/01/17/oil-sands.html>
- 3 “The Oil Sands; Towards Sustainable Development,” Standing Committee on Natural Resources, March 2007. P 53  
4 “Sounding an alarm for Alberta – an interview with Peter Lougheed” Policy Options. September 2006. p.6.  
5 Dr. Jeffrey Short quoted in “Study Finds Carcinogens in Water Near Alberta Oil Sands Projects,” by Ian Austen,  
New York Times, November 9, 2007.
- 6 Ray Ladouceur quoted in Timoney, K, 2007. A Study of Water and Sediment Quality as related to Public Health Issues Fort  
Chipewyan, Alberta – on behalf of the Nunee Health Board Society.
- 7 Suncor. 2005. Voyageur Project. Project Application and Environmental Impact Assessment and Environmental Setting Reports.  
Volume 3. Air Quality, Noise and Environmental Health.  
8 <http://www.health.gov.ab.ca/resources/publications/ArsenicReport.pdf>  
9 Timoney, 2007. P67  
10 Timoney, 2007
- 11 “Why is cancer sweeping tiny Fort Chipewyan?,” by Patrick Brethour, Globe & Mail, May 22, 2006  
12 Alberta Health and Wellness. 2006. Fort Chipewyan Health Data Analysis. Document: Fort Chipewyan presentation  
25july2006(2).ppt  
13 “Feds target medical whistleblower: doctor claims.” CanWest News Service. November 12, 2007.  
14 Timoney, 2007. P61  
15 Fort McMurray Today, Tuesday November 20, 2007  
16 <http://www.cbc.ca/canada/north/story/2007/03/06/cema-pullout.html>  
17 Timoney, 2007.
- 18 Mackenzie River Basin Board, 2003. State of the Aquatic Ecosystem Report, iv.  
19 Timoney 2007, p 66.  
20 Petersen et al, 2003. Long-term Ecosystem Response to the Exxon Valdez Oil Spill. Science.  
21 Petersen et al, 2003.  
22 Timoney 2007, p.42  
23 Myers et al., 2003. Establishing the causal relationship between polycyclic aromatic hydrocarbons (PAH) exposure and hepatic  
neoplasms and neoplasia-related lesions in English sole (*Pleuronectes vetulus*). J. Human Ecol. Risk Assess. 9:67-94.  
24 Timoney 2007, p67  
25 US Department of the Interior, Bureau of Reclamation. <http://www.usbr.gov/lc/hooverdam/History/essays/biggest.html>  
26 Stupid To The Last Drop. William Marsden. Alfred A. Knopf Canada. December, 2007. P. 170.  
27 B. Peachey, Strategic Needs for Energy Related Water Use Technologies. Water and the EnergyINet (2005), p. 34,  
[http://www.aeri.ab.ca/sec/new\\_res/docs/EnergyINET\\_and\\_water\\_Feb2005.pdf](http://www.aeri.ab.ca/sec/new_res/docs/EnergyINET_and_water_Feb2005.pdf).
- 28 National Energy Board 2004. Canada’s Oil Sands: Opportunities and Challenges to 2015.  
29 International Commission on Large Dams, 2001. Tailings Dams Risk of Dangerous Occurrences: Lessons learnt from practical  
experiences Bulletin 121, p.8. <http://www.mineralresourcesforum.org/docs/pdfs/Bulletin121.PDF>  
30 Nikiforuk, A. 2007. Dirty Secrets, Explore. March 2007, p63.  
31 MacKinnon, M. 2004 , Syncrude Research, Oil Sands Water Quality Issues: Properties, Treatment and Discharge Options, 2004.  
[http://www.conrad.ab.ca/seminars/water\\_usage/2004/O\\_S\\_water\\_quality\\_prop\\_treat\\_and\\_discharge\\_options\\_MacKinnon\\_.pdf](http://www.conrad.ab.ca/seminars/water_usage/2004/O_S_water_quality_prop_treat_and_discharge_options_MacKinnon_.pdf) P21.  
32 Ibid. p17, p22, p26 respectively  
33 NEB, 2004.  
34 Standing Committee on Natural Resources, 2007. P46  
35 B. Peachey, Strategic Needs for Energy Related Water Use Technologies. Water and the EnergyINet (2005), p. 34,  
[http://www.aeri.ab.ca/sec/new\\_res/docs/EnergyINET\\_and\\_water\\_Feb2005.pdf](http://www.aeri.ab.ca/sec/new_res/docs/EnergyINET_and_water_Feb2005.pdf).

36 Pollet, I and Bendell-Young, L.I., 2000. Amphibians as Indicators of Wetland Quality in Wetlands Formed from Oil Sands Effluent. *Environmental Toxicology and Chemistry*. Vol.19, No.10: 2589-2597.

37 Gurney, K.; Williams, T.D.; Smits, J.E.; Wayland, M.; Trudeau, S.; Bendell-Young, L.I., 2005. Impact of Oil-Sands Based Wetlands on the Growth of Mallard (*Anas Platyrhynchos*) Ducklings. *Environmental Toxicology and Chemistry*, Vol. 24, No.2: 457-463.

38 Rogers, V.V.; Liber, K.; MacKinnon, M.D. 2002. Isolation and characterization of naphthenic acids from Athabasca oil sands tailings pond water. *Chemosphere* 48:519-527.

39 "Air Pollution Targets for the Oil Sands Sector," Environment Canada, session with NGOs, June 7, 2007, page 26.

40 "Air Pollution Targets for the Oil Sands Sector," Environment Canada, session with NGOs, June 7, 2007, page 27.

41 Ibid, p. 27.

42 "Regulatory Framework for Air Emissions," Government of Canada, 2007, p. v.

43 "Acid rain threatens Western Canada, government warned," Allan Woods, CanWest News Service, June 27, 2006.

44 Based on NPRI data – see for example [www.pollutionwatch.org](http://www.pollutionwatch.org)

45 Canadian Acid Deposition Science Assessment. Environment Canada, 2004. Pp. 107-8.

46 Ibid, p. 1.

47 "Air Pollution Targets for the Oil Sands Sector," Environment Canada, session with NGOs, June 7, 2007, page 27.

48 <http://www.trca.on.ca/Website/TRCA/website.nsf/frmNewsArticleDisplay?OpenForm&NoteID=NT0000C3EA>

49 "Air Quality in Northern Saskatchewan," Maqsood et al, Saskatchewan Environment, presentation at The Fourth Canadian Workshop on Air Quality, Feb. 14-6, 2008

50 2004 Canadian Acid Deposition Science Assessment, Summary of Key Results, Government of Canada, p. 2.

51 Ibid, p. 11.

52 Ibid, p. 12.

53 "Passing Out in Upgrader Alley," by Lori Theresa Waller, the Dominion, October 20, 2007

54 [http://www.ec.gc.ca/pdb/querysite/facility\\_substance\\_summary\\_e.cfm?opt\\_npri\\_id=0000006546&opt\\_report\\_year=2006](http://www.ec.gc.ca/pdb/querysite/facility_substance_summary_e.cfm?opt_npri_id=0000006546&opt_report_year=2006)

55 See: [http://www.shell.com/home/content/ca-en/news\\_and\\_library/press\\_releases/2007/november19\\_scotford\\_upset.html](http://www.shell.com/home/content/ca-en/news_and_library/press_releases/2007/november19_scotford_upset.html)

56 See: <http://www.sia.ab.ca/cms/CAER/SafetyTips/tabid/922/Default.aspx>

57 "Air Sampling in North-Central Alberta," Prof. Donald Blake, University of California – Irvine, April 14, 2007.

58 See for example: Scotford Upgrader Expansion Application (April 2005) Volume 2, Section 24, pages 41 and 43; BA Energy Upgrader Application Volume 2 (May 2004) Section 61 page 6-32; NorthWest Upgrader Application; CanTox Environmental Project No 88060 (Jan 23, 2006) Table 10, page 57 – 58 and Table 11, pages 71 of 198.

59 "Heartland set to meet airshed targets," By Dave S. Clark, Sherwood Park News, November 27, 2007.

60 "Pipeline to B.C. back on track," Gordon Jaremko, The Edmonton Journal, December 29 2007

61 "Exposing Canada's Chemical Valley," Ecojustice, October 2007, p. 13.

62 Ibid, p. 20.

63 "Pollution debate born of Chemical Valley's girl-baby boom," by Martin Mittelstaedt, the Globe and Mail, November 15, 2005.

64 "Daley threatens to sue BP over lake pollution," Chicago Sun-Times, Aug 2, 2007 by Fran Spielman

65 "BP under gun to expand production, limit pollution," Chicago Tribune, Michael Hawthorne, November 19, 2007.

66 "Husky adds Valero refinery in U.S. to oilsands holdings," Jon Harding, Financial Post Published: Thursday, May 03, 2007.

67 "Husky, BP join up for oilsands partnership," Edmonton Journal, December 5, 2007.

68 Natural Resources Defense Council, personal communication, October 2007.

69 See for example: [http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4\\_syr\\_spm.pdf](http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf)

70 The Pembina Institute estimates 2007 emissions to be between 39.3 and 41.4 million tonnes for 2007. See: letter to Ms. Rachel Doctors, Illinois Environmental Protection Agency, June 15, 2007.

71 "The Climate Implications of Canada's Oil Sands Development," the Pembina Institute, November 29, 2005, p.5.

72 See "Ontario Greenhouse Gas Emissions Targets: A Technical Brief," Government of Ontario, June 18, 2007.

73 "Oil Sands Fever," by the Pembina Institute, November 2005, p. 15.

74 The Canadian National Energy Board predicts a decline in Canadian gas production under all price scenarios. See: “Short-term Canadian Natural Gas Deliverability 2007-2009,” October, 2007.

75 See for example Matthew Simmons in “The Oil Rush,” US News and World Report, by Marianne Lavelle, 16 April, 2006

76 Government of Canada figures cited in “Climate Change Policy and Canada’s Oil Sand Resources,” October 2007, p. 23.

77 According to the Pembina Institute, to meet BC’s targets, cuts of 36 million tonnes are needed from ‘business as usual’ by 2020, and tar sands growth would be more than 44 million tonnes from 31 million now to 75.5 million projected by Environment Canada.

78 “Canada in Bali,” by the Pembina Institute and the David Suzuki Foundation, November 22, 2007, p. 6.

79 “Climate Change Policy and Canada’s Oil Sand Resources: An Update and Appraisal of Canada’s New Regulatory Framework for Air Emissions,” by Anthony Footitt, report prepared for WWF by the Tyndall Centre for Climate Change Research, May 2007.

80 See: [http://www.energy.ca.gov/low\\_carbon\\_fuel\\_standard/](http://www.energy.ca.gov/low_carbon_fuel_standard/)

81 “Driving It Home,” NRDC et al, 2007, p. 7.

82 See: <http://gov.ca.gov/index.php?/fact-sheet/6504/>

83 “Alberta crude may be too dirty, US law says,” by Martin Mittelstaedt, the Globe and Mail, January 15, 2008.

84 See: [http://obama.senate.gov/press/070507-obama\\_harkin\\_in/](http://obama.senate.gov/press/070507-obama_harkin_in/)

85 “Carbon Capture and Storage: A Canadian Environmental Superpower Opportunity,” ICO2N alliance (Suncor et al), December 2007.

86 Ibid, Chart 5, p. 12.

87 See: <http://pm.gc.ca/eng/media.asp?id=1565>

88 “Getting to 2050: Canada’s Transition To A Low-Emission Future,” National Round Table on the Environment and the Economy, 2007.

89 See: <http://suncor.com/default.aspx?ID=17>

90 See: [http://cos-ar.beta.zu.com/annual\\_report/2006/html/highlights.php](http://cos-ar.beta.zu.com/annual_report/2006/html/highlights.php)

91 Report of the Joint Review Panel Established by the Alberta Energy and Utilities Board and the Government of Canada. EUB Decision 2007-013: Imperial Oil Resources Ventures Limited, Application for an Oil Sands Mine and Bitumen Processing Facility (Kearl Oil Sands Project) in the Fort McMurray Area, February 27, 2007.

92 See for example, Kearl, p. 80.

93 See for example, the CEAA Joint Panel decision on Shell Jackpine, p. 34.

94 CEPA 1999 Review; Interim Government Response, October 2007.

95 See: <http://www.oag-bvg.gc.ca/domino/reports.nsf/html/c20021001ce.html>

96 “The Air We Breathe,” David Suzuki Foundation, 2006, by David Boyd, p. 5.

97 See: <http://www.ec.gc.ca/default.asp?lang=En&n=714D9AAE-1&news=4F2292E9-3EFF-48D3-A7E4-CEFA05D70C21>

98 See: <http://www.cen-rce.org/eng/caucuses/toxics/docs/Comparison%20of%20CMP%20to%20past%20structures%20final%20may%2011%202007.pdf> and <http://www.cen-rce.org/eng/caucuses/toxics/docs/NPRI%20DSL%20paper%20final%20April%2012%202007.pdf>

99 “Imperial Oil Resources Ventures Limited,” Joint Panel Report EUB-Canada, February 27, 2007, p. viii.

100 See application of Pembina et al vs. Attorney General of Canada et al, Federal Court of Canada, April, 2007.

101 See Kearl Joint Panel report, pp. 54-60.

102 See Kearl, pp. 79-80.

103 See: <http://www.edmontonsun.com/News/Alberta/2007/10/16/4579825-sun.html>

104 See: <http://www.cbc.ca/canada/edmonton/story/2008/01/11/stelmach-oilsands.html>

***“it is just a moonscape. It is wrong in my judgement, a major wrong...  
So it is a major, major federal and provincial issue.”***

— THE HONOURABLE PETER LOUGHEED, former Premier of Alberta

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