

**THE OIL SANDS ENVIRONMENTAL FOOTPRINT:  
MEASURING POLLUTANTS AND MANAGING  
THEIR IMPACT**

**NOTES FOR DISCUSSION  
PREPARED FOR THE MUNK SCHOOL FORUM**

**“UNDER NEW MANAGEMENT?  
OIL SANDS DEVELOPMENT AS IF THE  
ENVIRONMENT MATTERED”.**

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“Canada’s international reputation as a green and gentle nation has long been a matter of national pride. But is that reputation deserved? Canada’s actions on environmental issues—from ignoring Kyoto Protocol targets to obstructing progress at United Nations climate-change talks—are increasingly raising eyebrows, both at home and abroad. Perhaps nothing is more emblematic of this reality gap than Canada’s determination to mine its tar sands at a frantic rate. The sands are a dirty source of oil. They require more energy for oil extraction than do conventional reserves, producing extra greenhouse-gas emissions. The industry has torn up vast swathes of landscape, created toxic ponds of waste and released pollutants into waterways....

“It would be unrealistic to expect that we could harvest fossil fuels or minerals without an effect on the environment. No form of mining is clean. But the fast development of the tar sands, combined with weak regulation and a lack of effective watchdogs, have made them an environmentalist’s nightmare....

“...many of [the environmental] rules are weaker than they seem. A boom in production will still see overall emissions go through the roof. Only a single 1 km<sup>2</sup> plot has been certified as reclaimed so far in more than 600 km<sup>2</sup> of mining area. A long-promised Alberta land-use framework, which would set limits on development, has yet to be completed. And of five mining operations that have had their plans for dealing with tailings ponds evaluated, just two met directives. The other three were granted grace periods extending to 2018 to sort out their mess....

“Canada’s tar sands, like the Deepwater Horizon oil spill, are a warning sign of things to come. Future sources of fossil fuels will only get dirtier and riskier.”

*From an Editorial in Nature 468 (25 November 2010), p. 476*

## Background

In the spring and summer of 2010, some US political leaders were expressing concern about “Canada’s dirty oil.” Given that Canada is now the largest supplier of non-domestic oil to the United States at 1.9 million barrels per day (projected to rise to 3.5 million bbls/day in 2025), almost all of this from the oil sands, this is clearly a crucial issue for Canada. House Leader Nancy Pelosi, Senator Lindsey Graham, and Democratic Congressmen Tim Mahoney and Rick Boucher, who was also chairman of the House Subcommittee on Energy and Air Quality, were amongst those who visited Alberta. Their host, Premier Ed Stelmach, claimed that oil sands oil was no dirtier than conventional oil from some despotic third world countries. However, 2011 studies from Stanford University indicate that oil sands oil produces 20-25% more greenhouse gas emissions (as CO<sub>2</sub> equivalents) than the average conventional oil used by EU countries.

Meanwhile, a critical paper co-authored by David Schindler and his colleagues appeared in a 2010 issue of the *Proceedings of the National Academy of Science* (US). This paper, and another in the same journal in December 2009, suggested major flaws in the government- and industry-sponsored monitoring programs, primarily those of RAMP, the Regional Aquatics Monitoring Program. Two weeks later, Schindler, several other scientists, medical doctors, and native leaders held a press conference to display malformed fish that had been caught in the Athabasca River in 2009-2010 (This press conference was subsequently featured prominently in a CBC *Nature of Things* documentary, “The Tipping Point,” broadcast in January 2011). Schindler and colleagues signed a letter to Prime Minister Stephen Harper, requesting that a study be undertaken to explore whether the malformations were caused by pollutants from the oil sands.

In September 2010, the renowned film director James Cameron (*Titanic*, *Avatar*) toured the oil sands. His visit received considerable coverage in Maclean’s magazine and a “One-on-One” interview with Peter Mansbridge on CBC TV. Shortly after these events, and partly in response to this heightened public interest, the then federal Minister of Environment Jim Prentice met with Schindler and his colleagues. He announced the formation of a federal panel to advise the minister on an appropriate scientific monitoring process. The panel delivered its report in mid-December, and the minister (interim minister John Baird) indicated that the federal government needed to “up its game” in environmental oversight of the oil sands. Alberta’s Minister of Environment Rob Renner and Premier Ed Stelmach also announced that the provincial monitoring would be improved for the river. One of the principal recommendations of the federal report was that the federal and provincial governments strive to cooperate and work together to develop a world-class monitoring and regulation system.

Also in December 2010, the Royal Society of Canada released its Expert Panel report on the “Environmental and health impacts of Canada’s oil sands industry.” This 400-plus page document consists of an extensive examination of the relevant research. The panel concluded that, while evidence for some concerns about the oil sands, such as human-health effects, was very weak because of inadequate research, much research remains to be done. In particular, the documentation of water and air pollution is inadequate, and the costs and difficulties of land reclamation have been seriously understated.

The response of the Alberta government was to form a separate panel to look specifically at the water quality data collected by RAMP, by Alberta Environment, and by Schindler’s team at the University of Alberta, with the aim of understanding the differences in the results. This panel reported on March 7, 2011 (Dillon et al., 2011), and the main thrust of its report was that the sampling and analytical methods used by the RAMP program were inadequate.

Through January and February 2011, both the federal and Alberta governments were active in developing plans to improve the environmental oversight of the oil sands. Environment Canada has been working on a plan for the necessary scientific research, and, in late January, Alberta announced the formation of a new provincial panel to assist in the development of an entirely new “monitoring, evaluation and reporting” system for the Lower Athabasca River. Another external review of RAMP, organized by the Alberta Research Council, was released in early February and indicated that none of the earlier concerns about this organization had been addressed.

Given this background of heightened interest and activity (see also additional details of the history of oil sands evaluation in the Appendix), we believe that the present is an ideal time to step out of the political arena, to pause for a review of what are the most critical issues, and to assess what most needs to be done. The Munk School forum has been designed to provide this opportunity, and the present document is an attempt to highlight the major issues that we hope to discuss.

## This Briefing Document

In the paragraphs below, the environmental issues concerning the oil sands, and the management and governance issues these raise, are indicated by subheadings. Bullet points indicate specific concerns, and brief paragraphs focus on the major narratives to be addressed. The paper concludes with a focus on the most immediate concern, which is the need to address water quantity and quality issues with respect to fresh water supply and fisheries. In particular, the structure of agreements between Alberta and the Northwest Territories with regard to the Lower Athabasca basin needs to be addressed. There have been calls for a suspension of new project approvals and water licenses until long-term water issues have been properly researched and documented.

### Groundwater

- Deep vs. shallow regional groundwater systems (saline vs. fresh)
- Background (“natural”) pollution levels
- Tailings ponds seepage
- Effects of *in situ* projects (e.g., steam leakage from SAG-D into buried channels)
- Deep disposal of tailings water
- Instrumentation and statistics
- Publicly available and timely data analysis and interpretation

The Athabasca River and its tributaries flow through and erode into the oil sands within the development area. Therefore, it has long been understood that some natural background pollution is seeping into the surface waters from this source. Regional hydrogeological studies, of which there are few, suggest that the rate of groundwater discharge into the river system (termed “baseflow”) is low and the pollution load minor, but this has never been specifically addressed by careful sampling and analysis. Sampling of undisturbed areas of the groundwater system remote from present development projects, would provide the necessary comparative data. In addition, there is a pressing need for public data relating to potential tailings pond seepage, mine-site dewatering, and the effects of subsurface steam injection at the *in situ* projects. It has also been shown that surface disturbance, such as that generated by the large strip mines, releases stored contaminants into the surface waters and shallow groundwater system.

### Surface Waters

- Background (baseline) levels of contaminants in lake sediments
- In-flow (discharge) issues, especially during winter
- Natural pollution sources and levels
- Industrial pollution (including cumulative effects of oil sands and pulp and paper), polyaromatic hydrocarbons (PAH), metals, and other toxins
- Biomarkers and characterization of industrial sources
- Downstream pollution: health issues at Fort Chipewyan, Lower Athabasca system
- Field methods, instrumentation, and statistics
- Publicly available and timely data analysis and interpretation

Rivers and lakes have been sampled by the Regional Aquatics Monitoring Program (RAMP) since 1997. However, there have been serious criticisms of this program because of inadequate and inconsistent sampling and analytical strategies and a lack of openness with regard to the data, data analysis, and interpretation. A restructuring of the water monitoring program is one of the major current objectives of both federal and provincial study panels. Systematic sampling of the Athabasca River and its tributaries several times a year needs to be undertaken, specifically to test for polycyclic aromatic hydrocarbons and toxic metals. In addition, sampling of lake and pond sediments needs to be carried out to establish background, historic levels of groundwater and surface water pollution in the development area. Amongst the major concerns is the level of toxins released into the waters from melting snowpack during the spring. Airborne contaminants accumulate in the snow over the winter, and the release of these substances during the local spring melt is responsible for the highest levels of contamination in the surface waters. Of particular concern is that this is the time when many fish populations are spawning.

## Air

- Characterization and quantification of industrial “smoke-stack” emissions (i.e., SO<sub>x</sub>, NO<sub>x</sub>, fine particulates, Hg, GHGs, H<sub>2</sub>S, amongst others)
- Odour problems: real-time monitoring and management
- Coker dust: composition and distribution
- Tailpipe emissions and land disturbance by equipment
- Deposition of organic and inorganic toxins
- Characterization and monitoring of long-range SO<sub>x</sub>-NO<sub>x</sub>, aerosol and particulate problems, acid rain, downwind effects (Saskatchewan)
- Snowpack sampling
- Field methods, instrumentation, and statistics
- Publicly available and timely data analysis and interpretation

Industrial installations in the oil sands development area, including power plants and upgraders, are associated with significant releases of emissions. Despite constant improvements in emissions controls, local, temporary odour problems (hydrogen sulphide, SO<sub>x</sub>, NO<sub>x</sub>) at communities such as Fort McKay are common. Polycyclic aromatic hydrocarbons, metals, and other toxins have been recorded in air samples and in snowpack, indicating aerial transport. Widely dispersed SO<sub>x</sub>-NO<sub>x</sub> gases are responsible, amongst other problems, for concerns about acid rain in some northern Saskatchewan lakes. Coke dust from the Suncor upgrader plus combustion emissions and dust churned up by mining operations and equipment movement are commonly responsible for a visible atmospheric haze. The oil sands industry represents a significant and rapidly increasing source of airborne contaminants, as industry’s own reporting to the National Pollutant Release Inventory reveals. Deposition of dust and aerosols on plants affects the health of animals and humans for whom plants are a source of food.

## The Additive Nature of Environmental Issues

Water and air pollution cannot be considered as separate, isolated problems. While the major concern is with water quality and water quantity, it needs to be taken into account that a significant component of the surface waters consists of baseflow that enters the river systems from groundwater and now, also, from the dewatering operations carried out to facilitate surface mining. As Schindler’s work has demonstrated, airborne pollution represents a significant component of the pollutants and toxins that enter the surface water system, much of this from the snowpack. The maximum rate of delivery of this airborne pollution is during the spring, when the snow is melting, at precisely the time when fish are spawning. There is a pressing need for an evaluation of the total pollution flux, using mass balance calculations and transport models.

## Animal and Plant Life

- Population health
- Fragmentation of habitat
- Traditional Environmental Knowledge (First Nations)
- Publicly available and timely data analysis and interpretation

Several recent peer-reviewed papers suggest that animal and plant habitats are being severely disrupted and fragmented by multiple development projects. There is an inadequate knowledge base concerning the effects of this fragmentation on population health and survivability. First Nations observations (comprising part of what is called Traditional Environmental Knowledge) constitute a wealth of information regarding the health of specific plant and animal species that could contribute to a developing understanding of the long-term effects of air and water pollution on their ecological sustainability. The industry's own Cumulative Environmental Management Association (CEMA) has proposed that large conservation reserves must be set aside to protect and maintain wildlife populations, but no action has been taken so far.

## Fish

- Low-flow problems
- Causes of deformities
- Contaminant burdens and industrial contributions (Hg, As, Cd, Pb)
- Issues associated with federal Fisheries Act legislation
- Publicly available and timely data analysis and interpretation

While industrial water withdrawals from the Athabasca River are not yet considered excessive, low in-flow conditions in the winter are a concern because they can lead to the river freezing right to the bottom, preventing upstream migration of fish for spawning. Low oxygen under ice has been measured at several sites. Hydrocarbon and metal pollution in the Athabasca River and its tributaries from oil sands development and from pulp and paper operations have had observable effects on the magnitude and health of fish populations in the rivers and streams of the Athabasca basin (pulp and paper pollution has now largely been controlled). Fish with tumors and other deformities have been found far downstream from Fort McMurray, suggesting that trace contaminants, or the fish affected by them, are dispersed very widely.

There is evidence from the Niagara River that alkylated PAHs of the sort released by the oil sands are important causes of tumors in fish. Older studies of the Athabasca and its tributaries do not mention abnormalities in fish, in agreement with reports from older

native fishermen. But RAMP reports an incidence of 2-6% deformities in its annual catch. Even higher incidences of fish deformities are reported by fishermen at Fort Chipewyan in the past few years. Many of the deformities are similar to those described in surviving embryos of fish that were exposed to bitumen-rich sediments near the oil sands.

### Effects on First Nations Populations and Communities

- Very different issues at Fort McKay vs. Fort Chipewyan
- Health effects (body burdens of contaminants)
- Threats to and management of traditional way of life
- Violations of Treaty 8
- Publicly available and timely data analysis and interpretation

Fort McKay, surrounded on all sides by oil sands development projects, experiences serious air and water quality problems, yet the First Nations peoples there are willing to cooperate with development because of the jobs and prosperity brought to the community. Residents of Fort Chipewyan, downstream from the development area, fear that long-range pollution, especially that related to surface waters, is seriously affecting human wellbeing and the health of the fish population, which still represents a major component of the traditional economy. There are, in particular, concerns regarding the occurrence of rare cancers, which may be linked to pollution. Long experience with developers and with governments preoccupied by development has generated a widespread sense of distrust amongst the First Nations residents that makes them reluctant to believe in or take part in new government-mandated monitoring programs. There also remain serious, unresolved issues under Treaty 8 concerning the access rights of First Nations communities to traditional lands for hunting, trapping, and fishing. Their trust has to be re-earned.

### The Legal Framework

- Federal mandates and obligations (federal lands, deleterious substances, fish health, navigable waters, national parks)
- Provincial responsibilities: water use licensing, local and regional pollution, health, etc.
- Transboundary issues: federal, provincial (Alberta, Northwest Territories), national parks, and First Nations
- Local health consequence (air and water)
- Publicly available and timely data analysis and interpretation



The federal, provincial, and Northwest Territories governments have intersecting and overlapping mandates with regard to environmental issues, particularly with regard to water. Provincial responsibilities focus on domestic water supply and industrial development, with concerns for local water withdrawals and contamination. Federal responsibilities are concerned with wider issues, such as river hydrology and navigation, fisheries and fish habitat, the transport and deposition of pollutants, First Nations issues, transboundary issues, and the environment of national parks (in this case, Wood Buffalo National Park) and federal lands.

### The Long-term Management Framework

- Managing cumulative effects vs. individual project licensing
- Land reclamation: restoration of wetlands, boreal forest, costs, timelines, immediacy
- Integration of federal and provincial responsibilities
- First Nations: issues of mistrust and duty to consult
- Publicly available and timely data analysis and interpretation

An overarching concern of environmental management is that there has been little or no focus on the long term. Project approval and licensing have been carried out on an individual project basis, with little or no attention paid to cumulative environmental effects. This has relevance to the monitoring and management of the total contaminant loads, to the increasing fragmentation of habitat as more and more projects are approved, and to many other factors. Much attention has been drawn to the small areas of former strip mining activity that have undergone reclamation, with the establishment of apparently healthy ground plant cover. While recent research by Suncor seems set to reduce tailings pond restoration from a forty-year cycle to about a decade, the cost and complexity of the restoration task is widely underestimated or misunderstood. In particular, while there is a desire to rebuild wetlands, their ecology is complex and not yet fully understood. Currently, the Cumulative Environmental Management Association (CEMA) is ostensibly addressing these issues, but with little authority or urgency. Furthermore, while CEMA includes representatives from industry and the government and NGO sectors, First Nations participation is limited as a result of the long history of mistrust by this community.

## Governance Issues

- Who does the science? The federal government, Alberta government, or both working together?
- Scientific oversight, public reporting, peer review, assured release and publication
- Inclusion of aboriginal communities (Northern River Basins model?)
- Should environmental management (licenses, water permits) be shifted from the Energy Resources Conservation Board (ERCB) to Alberta Environment (AENV)?
- Ensuring accountability and implementation of the recommendations that derive from this forum

Who does the science? The tradition in Alberta has been to farm out the field and laboratory work, the analysis, and the reporting almost entirely to contractors. The problems with this approach are a lack of consistency, a lack of independent review, and a lack of transparency. The highly critical reviews of RAMP are a testament to the failure of this approach. This method of governance also implies a lack of in-house expertise at Alberta Environment to evaluate the results and their implications. Environment Canada runs world-class science laboratories and has many highly qualified scientists on staff, yet has been largely absent from oil sands work due to lack of funding and lack of political direction.

Another serious issue is the lack of linkage between relevant government policy areas during the evaluation and licensing of projects by the Energy Resources Conservation Board (ERCB). Environmental Impact Assessments are generated in part from input created by CEMA, which means that there is an element of industry being closely involved in its own licensing process. Alberta Environment does not intervene directly in ERCB hearings, leaving the concern that the wider public interest in the environment is not being addressed. ERCB's mandate is to approve projects—to condition them on occasion—but to approve them.

A successful model for federal-provincial and First Nations cooperation was the Northern River Basins Program (1992-1996), which represented a major cooperative effort between federal and provincial partners. First Nations representatives were involved at all levels, including membership on advisory boards. The final report concluded: "There should be life after NRBP. An interjurisdictional body should be established to monitor and manage the river system." This did not happen.

While there is no question that the Province of Alberta has the clear constitutional authority to manage the oil sands, including most environmental issues directly related to project development, there are serious questions about the efficacy of provincial environmental management. The scientific input is poor and the process flawed.

Meanwhile, the broader public interests, including long-range implications—cumulative environmental impacts and transboundary problems—are not being addressed.

Interestingly, the website for Alberta Environment includes a lengthy commentary on the Royal Society report, within which there is this statement:

The environmental regulatory capacity of the Alberta and Canadian governments does not appear to have kept pace with the rapid expansion of the oil sands industry over the past decade. The Environmental Impact Assessment process relied upon by decision-makers to determine whether proposed projects are in the public interest has serious deficiencies in relation to international best practice. Environmental data access for cumulative impact assessment needs to improve.

The federal government has not been acting in accordance with its federal legal obligations, as outlined briefly above, although it has the competence to do so. It is widely acknowledged that the scientific standards and research capacity at Environment Canada, Fisheries and Oceans, and Natural Resources Canada are first class. However, what is needed is a fully transparent and publicly accountable monitoring system that is beyond the reach of day-to-day politics. A mechanism needs to be constructed that recognizes federal, provincial, and territorial interests, and also focuses on the broader public interest through independent management and long-term funding. Ideally, this science process should be an integral part of the oil sands project approval and licensing procedures, as they work their way through the Alberta governance system.

As *Nature* has indicated, Canada's reputation is on the line. Can we overcome the sometimes fractious relationships between federal and provincial jurisdictions to manage this large-scale problem? It is one big problem, and we are, after all, one people inhabiting one country.

## Immediate Concerns

One of the major overriding concerns regarding the oil sands is the rapid pace of development. Projects are being proposed, examined, and licensed in seeming disregard for long-term consequences. What are the long-term, cumulative effects of the rapid expansion of the oil sands industry, with its large-scale water use, on flow rates in the Lower Athabasca basin, particularly during the winter? How might climate change affect these rates? What buildup of air and water pollution can be expected? Can healthy fish populations be maintained down the length of the Athabasca River? These are the most pressing reasons for the establishment of effective science monitoring programs. As stated by Alberta Environment when it announced the initial plans for the new

monitoring panel in December 2010 (the panel that was ultimately established in late January 2011; see Terms of Reference in Alberta Environment 2010 in the sources listed below): “Building a provincial scale, world recognized, third party verified monitoring system for all environmental media, air, land, water and biodiversity is an ultimate goal of the Government of Alberta.”

Should water licensing be under the purview of the Energy Resources Conservation Board, as at present, rather than Alberta Environment? How are the federal and provincial environmental responsibilities and legislative mandates to be reconciled and integrated into approval and licensing procedures?

The issuance of new project approvals and water licenses should be suspended until the federal and Alberta governments have put in place world-class scientific monitoring programs that address these environmental issues and management frameworks that are required to consider them as part of the licensing process.

## An Oil Sands Regulatory Checklist

### General Principles

- Relevant (addresses major issues and significant effects)
- Credible (peer-reviewed science)
- Transparent (publicly available data)
- Understandable (reports to Canadians on a yearly basis)
- Robust (scientific best practice and continuous improvements)

### Key Criteria for a World-class Information and Reporting System

- Independence from industry
- National scientific and federal leadership
- Transparent and collaborative governance model (a single integrated monitoring agency) with representation from areas directly impacted by rapid development: First Nations; Northwest Territories; Saskatchewan, Alberta, British Columbia, Manitoba; and the federal government
- Stable long-term funding for twenty-five years
- Focus on what matters: Is there any evidence of impact or degradation of ecosystems that could lead to an impact? And what are the boundaries or thresholds beyond which damage to landscapes and waterways will occur?
- Suspension of new project approvals and water licenses until there is a national scientific consensus that a transparent and effective regulatory oversight has been established for air, surface water, groundwater, wildlife, GHG emissions, and human health.

## Appendix

### Additional Background

In 2007, the Canadian House of Commons questioned the adequacy of stakeholder monitoring groups designed for consensus as opposed to scientific accuracy. It called for greater federal involvement given Ottawa's legislated responsibility for transboundary air pollution, greenhouse gas emissions, and harm to waterways and fisheries.

By 2008, the state of oil sands monitoring worsened as stakeholder groups responsible for water and cumulative effects clearly faltered. A 2008 PricewaterhouseCoopers report described the Cumulative Environmental Management Association (CEMA) as largely dysfunctional and frustrated by the pace of development. CEMA members felt "the likelihood of environmental management catching up with development in the region is near impossible." The report added that "Government should commit to filling in the policy and planning gaps that have impeded the progression of environmental management." In addition, an extensive federal scientific review of the Regional Aquatics Monitoring Program (RAMP) by nearly twenty federal scientists concluded that RAMP lacked scientific oversight, proper sampling protocols, inadequate monitoring sites and transparent public reporting.

In 2009 and 2010, two articles published in the prestigious *Proceedings of the National Academy of Sciences* by Erin Kelly and David Schindler (Kelly et al., 2009, 2010) squarely challenged the efficacy of pollution monitoring on the Athabasca River downstream of the oil sands. Both studies found what ad hoc monitoring had not: clear evidence of the contamination of the Athabasca River by air deposition and watershed destruction resulting in the release of polycyclic aromatic hydrocarbons and heavy metals. In response, industry, the Alberta government and the federal government strongly denied the findings. The resulting controversy forced more public studies and investigations on the real state of oil sands monitoring.

Between 2008 and 2010, the federal Standing Committee on Environment and Sustainable Development heard evidence on the impacts of the oil sands on Canada's water resources. Testimony from aboriginal groups, scientists, and government leaders documented the lack of federal involvement and the poverty of existing agencies. These findings proved so explosive and controversial that the committee failed to reach a consensus and issued no report. As a consequence two committee members, MP Linda Duncan and MP Francis Scarpaleggia, issued separate reports. Both reports demanded that the federal government "establish a comprehensive, independent and transparent monitoring program for water flows and water quality and air quality for the Lower

Athabasca River Basin. In addition, both reports requested that “The government should make significant new capacity-building investments in federal water science to support federal decision-making in the oil sands, including at the level of environmental assessment.”

In 2010, a federally appointed Oil Sands Advisory Panel, composed of some of Canada’s most distinguished scientists, examined the state of monitoring in the oil sands. It found that level of industrial activity dwarfed the scale of monitoring as well as basic scientific research. In addition, baseline ecological data was poor and ad hoc groups lacked defined leadership as well as “a coherent data management framework where information could be uploaded, shared or organized.” Until these shortcomings are addressed “the debate on the environmental performance in the oil sands will continue to revolve around the adequacy of the data collected and not, as it should be, on data interpretation and implications.”

In the fall of 2010, Scott Vaughan, Commissioner of the Environment and Sustainable Development, disclosed that Environment Canada recognized PAHs as a threat to water quality on the Athabasca River as early as 2001. Moreover, Environment Canada had insufficient data to “monitor threats related to population growth and economic development in the region as well as insufficient data to monitor the oil sands.” As of June 2010, the federal government “did not have the capability to monitor many of the toxic pollutants associated with oil sands production.”

At the end of 2010, the Royal Society of Canada issued a comprehensive report on the state of human health and environment associated with the megaproject. It, too, documented and confirmed insufficient monitoring for the project. In particular, it disclosed that “The environmental regulatory capacity of the Alberta and Canadian Governments does not appear to have kept pace with the rapid growth of the oil sands industry over the past decade. The EIA process relied upon by decision-makers to determine whether proposed oil sands projects are in the public interest has serious deficiencies in relation to international best practice. Environmental data access for cumulative impact assessment needs to improve.”

A comprehensive nine-member panel peer review of monitoring performed by RAMP in 2010 gave the group a failing grade. In fact, RAMP failed to achieve seven of its nine mandates involving water quality, acid rain, fish health, and other issues. It failed, for example, to “detect and assess cumulative effects and regional trends” and it failed to “collect adequate baseline data.” Sampling programs for fish and benthic organisms were deemed inappropriate and even “biased towards concluding no effect even if one is present.” Scientists even compared the monitoring program to chaotic boomtown sprawl:

“RAMP grew to its present form incrementally somewhat like a rapidly growing city without a planning department and no city plan. I am sure all of you have seen the result of poorly planned urban sprawl: greater Phoenix comes to mind.”

In March 2011, the Alberta Water Monitoring Data Review Committee highlighted the scale of failure on monitoring for contaminants in the Athabasca River downstream of the oil sands. It reported that government monitoring “was not intended to assess impacts of the oil sands on the river” and that RAMP suffered from low sampling frequency. The committee also concurred with the *Proceedings of the National Academy of Sciences* findings showing polycyclic aromatic hydrocarbons and trace metals “being introduced into the environment by oil sands operations.” Like previous reports, it called for monitoring programs that “are conducted with scientific rigor and oversight.”

## Important Background Sources

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