



TAR SANDS REALITY CHECK

REALITY CHECK: Air Pollution and the Tar Sands

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ENVIRONMENTAL DEFENCE is Canada's most effective environmental action organization. We challenge, and inspire change in government, business and people to ensure a greener, healthier and prosperous life for all.

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REALITY CHECK: COUNTERING INDUSTRY SPIN IN THE TAR SANDS

Big Oil is spending millions of dollars to greenwash the tar sands, Canada's fastest growing source of greenhouse gas pollution. It's time for a reality check. This is the second in a series of reports that will counter Big Oil's claims that the environmental impacts of the tar sands are under control. The reports offer a reality check on the failure of the oil and gas industry to prevent irreversible damage to our air, our water, our communities, our health, our wildlife and our climate. It's time to look past Big Oil's slick PR spin and focus on the truth about the tar sands. It's time to stand up and demand the clean, safe and renewable energy future we deserve.

Visit tarsandsrealitycheck.com for the truth about the tar sands.

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An aerial photograph of a large industrial facility, likely a tar sands processing plant. A prominent smokestack in the center-left emits a thick, white plume of smoke that rises into the sky. The facility itself is a complex of various structures, including storage tanks, pipes, and processing units, situated in a hilly, somewhat barren landscape. The overall scene conveys a sense of large-scale industrial activity and its potential environmental impact.

EXECUTIVE SUMMARY

On average, a person takes 20,000 to 30,000 breaths each day. For many of us, breathing is something we barely notice. It just happens. It's easy to take the air we breathe for granted. We often don't pay attention to our breath unless we're engaged in a breathing-focused activity, like swimming or yoga. Breathing also comes into focus if we find ourselves inhaling dirty air on a smoggy day, or driving past an industrial operation spewing pollutants. In general though, in North America we tend to have faith that the air we breathe is, for the most part, clean enough to keep us healthy.

The reality is that our air quality is being damaged by the tar sands. Alberta's tar sands region is testing the limits of dangerous airborne chemicals. Like many of the major environmental challenges facing the tar sands, air pollution is not adequately regulated, the data is not transparent or accessible to the public and experts, and the impacts of air pollution on the surrounding ecosystems and people are not well understood. What is known, however, is that toxic chemicals are being released into the air. If the tar sands expand, it is probable that the amount of chemicals released will surpass legal limits. If industry and government get their way and triple tar sands production by 2030, this risky situation will go from bad to much, much worse.

A study released in October 2013 found cancer-causing Volatile Organic Compounds at concentrations 6,000 times higher than normal in air samples taken in northern Alberta.

A study released in October 2013 found cancer-causing Volatile Organic Compounds (VOCs) at concentrations 6,000 times higher than normal in air samples taken in northern Alberta.¹ The same study found increased incidences of rare cancers associated with these dangerously high levels of air pollution, including leukemia and non-Hodgkin's lymphoma. Finding levels of air contamination higher than the world's most polluted cities, the researchers stated, "Our main point is that it would be good to proactively lower these emissions of known carcinogens. You can study it and study it, but at some point you just have to say, 'Let's reduce it.'"²



Tripling tar sands production would mean a 230 per cent increase in nitrogen oxides pollution, a 160 per cent increase in sulphur dioxide emissions and a 190 per cent increase in particulate matter.³

A tripling of tar sands production would mean enormous increases in toxic chemicals, including nitrogen oxides, mercury, sulphur dioxide and particulate matter, which can damage both human and environmental health. (For explanations about the impacts of these chemicals, see page 9.) More specifically, tripling tar sands production would mean a 230 per cent increase in nitrogen oxides pollution, a 160 per cent increase in sulphur dioxide emissions and a 190 per cent increase in particulate matter³ — all of which can hurt human health and our shared environment.

The lack of enforcement around environmental infractions is astounding. A recent study on enforcement of environmental incidents uncovered scathing evidence that the enforcement rate (incidents that were dealt with properly per existing regulations) was less than one per cent for the thousands of environmental infractions reported in the tar sands from 1996 to 2012. Of the data analyzed, two-thirds of the broken rules related to air quality. Many were reported by people in the region who became sick, or felt their eyes burning, and called authorities to report it.⁴ The study also found that companies are not on a trajectory of improving their environmental performance.⁵

While industry and government are making promises to introduce “world class” monitoring through initiatives like the Joint Oil Sands Monitoring Program (JOSM), many critical questions remain unanswered. For one thing, the industry has a very poor track record of living up to existing weak environmental standards set by Alberta. Introducing a new monitoring system won’t help if industry continues to fail to adhere to existing standards and if the province continues not to enforce consequences for breaking the rules.

Improvements are required, not just in terms of adhering to standards but also in the

strength of existing regulations. Regulations must keep up with the growing dangers of air pollution. As it stands now, they lag far behind current production levels. In order to manage the mess already on their hands, industry and government must address the following concerns related to monitoring, regulation and enforcement:

- **Most of the air quality monitoring done is self-monitoring by the companies,** and in the case of programs like JOSM, industry provides the funding for the monitoring, creating a conflict of interest worth billions of dollars. Recently, it was unveiled that JOSM had collected data showing a dangerously high level of mercury emissions around the tar sands. However, JOSM did not publish these results. The data was later published by Environment Canada;⁶
- **Monitoring is important but it alone won't improve air quality. Air quality data must be used to inform regulation and policy.** Industry and government have a poor track record when it comes to matching data with the policy required to fix the problems;
- **Current monitoring and the proposals on the table for future monitoring are missing a critical piece of the puzzle: the cumulative monitoring of dangerous air pollution.** Both current monitoring and plans for future monitoring may capture point source measurements, but this fails to measure the cumulative effects of airborne toxics.

These measurements are critical in understanding the effects of long-term air pollution and the impacts on local ecosystems and communities;

- **When environmental incidents occur, like a spike in air pollution, recent data shows that less than one per cent of these environmental infractions result in any enforcement action.**⁷ That is to say, even when monitoring reports breaches in existing (weak) regulations, the government does nothing about it. The result? Oil industries have little incentive to change their practices and clean up their act.

Air quality standards in Alberta are lower than international standards set by the World Health Organization.

While current levels of dangerous airborne chemicals, such as nitrogen, sulphur dioxide and particulate matter, are of concern today, plans to triple tar sands production mean that the problems we are seeing now are only a taste of what's to come, if industry gets its way. Air quality standards in Alberta are lower than international standards set by the World Health Organization (For a detailed comparison, see Figure 1 on page 6). And industry's track record is one of non-compliance, giving little reason to trust industry will do its part in keeping the air we breathe clean and safe.

THE TAR SANDS

The Canadian tar sands, also known as the oil sands, are the largest industrial project on earth. Yet, few people are aware of the rapid pace of growth and its impacts on our environment, economy, and society. Dangerous cancer-causing pollutants from the tar sands have been found in concentrations 6,000 times higher than normal levels in areas near tar sands operations.⁸

REALITY CHECK: AIR POLLUTION AND THE TAR SANDS

Reality Check

Fort McMurray is a small city surrounded by boreal forest and yet the air quality is often compared to cities like Toronto. The air quality should be much better than urban centres with 72 times the population.⁹ Air pollutants around Fort McMurray have shown concerning spikes in measurements at stations in both industrial areas and residential communities.

While industry claims that “air quality in Fort McMurray is better than many North American cities – including Toronto, Edmonton and Seattle,”¹⁰ the reality is that Fort McMurray, a small city nestled in the boreal forest, should have much better air quality than cities with 15 to 72 times the population.

The province of Alberta sets limits on pollutants that affect air quality, but these were built to be cheap and easy for industry and are well below international standards — too low to ensure safe air quality for Albertans.¹¹ Because the current limits are not set using the precautionary principle (see textbox on page 7 for explanation) for what is safe, the limits should be viewed as absolute maximums, beyond which harm to human health is a significant risk.¹²

Figure 1. Comparing ambient air quality standards of Alberta, the United States, the World Health Organization, and the European Union

	Alberta ¹³	United States ¹⁴	World Health Organization ¹⁵	European Union ¹⁶
Nitrogen oxides				
1 hr average ($\mu\text{g}/\text{m}_3$)	300	200	200	200
Annual average ($\mu\text{g}/\text{m}_3$)	45	40	40	40
Fine Particulate Matter				
24 hr average ($\mu\text{g}/\text{m}_3$)	30	35	25	25
Sulphur Dioxide				
1 hr average ($\mu\text{g}/\text{m}_3$)	450	350		350
24 hr average ($\mu\text{g}/\text{m}_3$)	125	125	20	125
Annual average ($\mu\text{g}/\text{m}_3$)	20	20		



THE PRECAUTIONARY PRINCIPLE

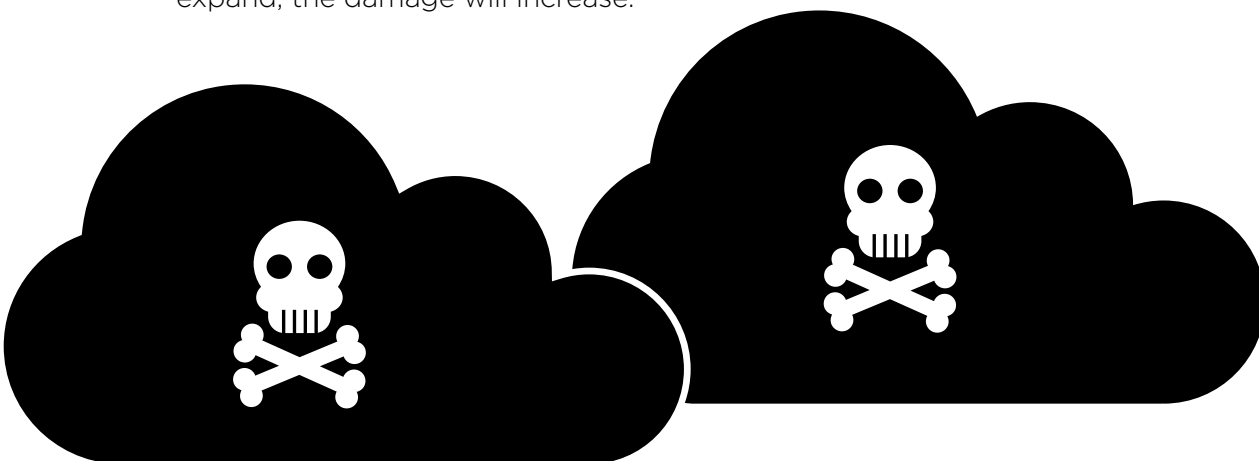
The precautionary principle refers to a duty to prevent harm where and when we can if science suggests there is cause for concern, even if not enough evidence has been collected to be conclusive. Enshrined in many international treaties, the principle is often used by policy makers to ensure that the public is protected from potential harm if scientists have found some evidence for concern and attention.

“When will the source stop sending black smoke into the air? Black smoke comes from the plant for months making people sick. Spoke to a contractor working at Syncrude, indicated that it has been on-going for the past 6 months and that everyone is getting sick.”

— Industrial worker's complaint¹⁷

In Alberta, the amount of some pollutants like nitrogen dioxide and sulphur dioxide are close to these maximums already, reaching 97 per cent and 71 per cent of the limit set at measurement stations near industrial facilities. Two of the highest readings for hydrogen sulphide and total reduced sulphur were nine times over the limit. Even air quality pollutant measurements taken in stations located in communities rather than directly in industrial areas reached nearly 50 per cent of the limits.¹⁸ The evidence is in. Air pollution from the tar sands is damaging air quality. If the tar sands continue to expand, the damage will increase.

The chemicals that are regularly monitored in air monitoring stations around the tar sands represent only a subset of the chemicals that are released during tar sands extraction and upgrading. In addition to harmful chemicals like sulphur dioxide and nitrogen oxides, dangerous chemicals like VOCs, and even chemicals banned in Canada — such as trichloroethane (a banned toxic chemical that causes nervous system depression) — have been identified in leaks and environmental incidents on tar sands sites.¹⁹



“A minimum of 4,063 alleged contraventions [broken rules] occurred between 1996 and mid-2012. Syncrude Mildred Lake (46.95%) and Suncor Oil Sands (39.65%) were responsible for the majority of the 4,063 contraventions. The contraventions were chronic and repetitive and indicated little progress towards better [environmental] management practices.”

— Timoney and Lee, 2013²⁰



Below is a list of several pollutants released through tar sands operations.

SULPHUR DIOXIDE

Health effects caused by exposure to high levels of sulphur dioxide include breathing problems, respiratory illness, changes in the lung's defences, and worsening respiratory and cardiovascular disease. (Sulphur dioxide and nitrogen oxides are the main precursors of acid rain.)²¹

PARTICULATE MATTER

Exposure can affect your lungs and your heart, and has been linked to irritation of the airways, coughing, difficulty breathing, aggravated asthma, development of chronic bronchitis, irregular heartbeat, nonfatal heart attacks and premature death in people with heart or lung disease.²⁴

NITROGEN DIOXIDE

Exposure to nitrogen oxides impacts the respiratory system, including airway inflammation in healthy people and increased respiratory symptoms in people with asthma. It can cause or worsen emphysema and bronchitis, and can aggravate existing heart disease, leading to increased hospital admissions and premature death.²²

HYDROGEN SULPHIDE

People living near industries that emit hydrogen sulphide have an increased risk of eye irritation, cough, headache, nasal blockage and impaired neurological function (including reaction time, balance, colour discrimination, short-term memory and mood). People working in industries where hydrogen sulphide exposure is common may have decreased lung function and increased risk of spontaneous abortion and impaired neurological functions.²⁵

VOLATILE ORGANIC COMPOUNDS (VOCs)

Key symptoms associated with exposure to VOCs include eye irritation, nose and throat discomfort, headache, allergic skin reaction, nausea, nosebleeds, fatigue and dizziness. Some VOCs, like benzene, are highly carcinogenic in humans.²³

MERCURY

Mercury is found in trace amounts in nature, but prolonged exposure can lead to brain damage, kidney and liver damage, and can affect the healthy development of a fetus.²⁶

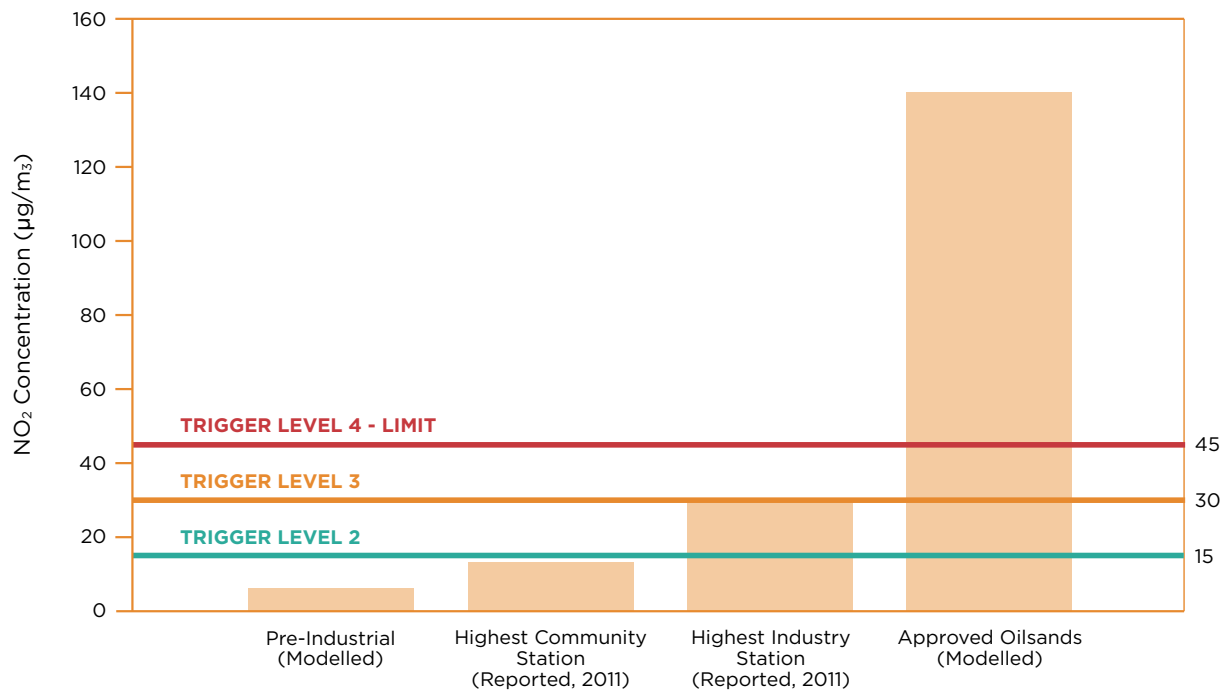
Reality Check

Today the tar sands are a major source of air pollution. Even oil industry projections show that tar sands expansion will push some air pollutants above legal limits.

Levels of nitrogen dioxide (NO₂) are reaching dangerous levels in Alberta's Lower Athabasca region.²⁷ While industry touts that it "has used technological advances to continually reduce nitrogen dioxide (NO₂) and sulphur dioxide (SO₂) emissions on

a per barrel basis since production first began,"²⁸ because tar sands production continues to grow, the total concentrations of these harmful gasses are still soaring. Alberta's air quality limits are already being outpaced by approvals for new tar sands projects.²⁹ For example, based on Shell's model for all their approved but not yet built developments, NO₂ levels will greatly exceed provincially set warning trigger levels (which put in motion defined regulatory action), followed by legal limits when all of the approved tar sands projections are operational (See Figure 2 below).³⁰

Figure 2. Annual concentrations of Shell-Modelled NO₂ compared to trigger levels and limits (The Pembina Institute)³¹



Across the industry, if expansion is permitted as planned, the amounts of toxic air pollution will soar. Even taking into consideration expected improvements in per barrel emissions of air pollutants, total pollution will grow beyond legal limits and significantly surpass both international and provincial limits for the safety of human health within the coming decades. By 2030, at the current pace and scale of

expansion, nitrogen oxides will grow by 230 per cent, sulphur dioxide pollution will increase by 160 per cent, and there will be a 190 per cent increase in particulate matter.³² The direct impacts of these dramatic increases on human health are only beginning to be understood, but even at current pollution levels, air pollution is being linked to rare cancers in the tar sands region.³³

CONCLUSION

The tar sands are already polluting our air, and damaging the health of surrounding communities in Alberta. At current production levels of 1.8 million barrels of tar sands oil per day, there are already dangerous spikes in air pollution that go well beyond safe limits set by the World Health Organization and even beyond the weaker regulations set by the Alberta Energy Regulator. With the industry set on tripling expansion in the next 17 years, the cost of industry's failure to control its mess is going to have compounding and devastating impacts on the local communities that depend on safe air.

The world is watching. Our largest trading partners are rightly unconvinced by industry and government's tar sands PR bonanza. The Canadian government is spending \$24 million on advertisements promoting the tar sands, money that could be better spent in a number of ways including understanding the local impacts on First Nations and other communities around the region. When it comes to taking care of the air that we breathe, like other environmental issues in the tar sands, actions speak louder than words. A lot of work is needed to prove that there is more than greenwashing and lip service at play.

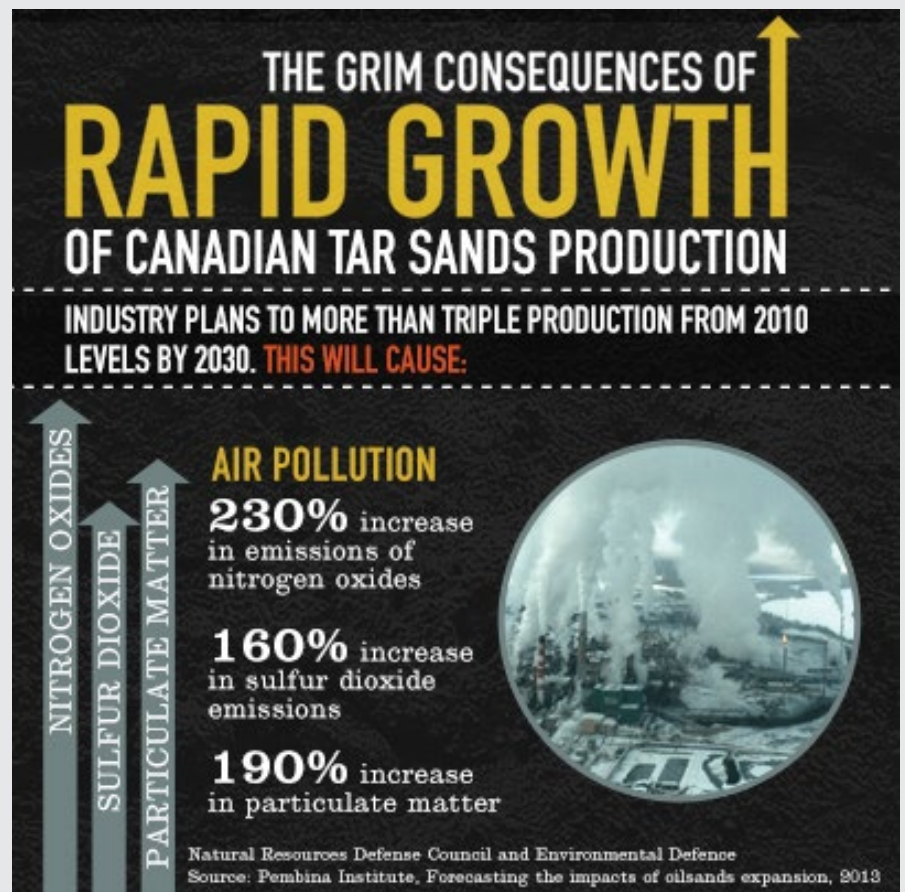
It's time for some important changes.

Monitoring must be built to include cumulative

data. Meaningful investment must be made in understanding the impacts of the accumulation of airborne toxics on surrounding ecosystems and communities. This monitoring must be transparent and

at the service of local stakeholders, not the companies that have a vested interest in business as usual.

Data being collected to monitor air quality in the tar sands region must be used to





At current production levels of 1.8 million barrels of tar sands oil per day, there are already dangerous spikes in air pollution that go well beyond safe limits.

inform meaningful regulatory changes that industry complies with. Monitoring alone is important but on its own will not control growing air pollution. Monitoring must be paired with and inform effective and enforced regulations in line with what science tells us is needed to protect our health.

When industry is out of compliance, the regulator must enforce consequences, otherwise even modest regulation will be in vain if industry has no incentive to do its part. Recent reports show when companies break existing regulations, less than one per cent of these environmental infractions result in any enforcement action. Enforcing the rules will give industry incentives to change its practices and clean up act.

Most importantly, new projects should not be approved as long as these developments continue to outpace industry's ability to keep the air clean and safe to breathe. Our clean air should not be sacrificed for Big Oil's bottom line. Industry needs to prove it is responsibly restricting air pollution from current projects before

the green light is given to new projects which could further damage our air quality.

And we need to remember that there are better alternatives to tar sands oil and fossil fuels as a whole for powering our future. Energy conservation and renewable energy can power our homes and businesses. We can have safe, clean affordable energy from renewable sources that don't pollute our air or water, and are better for our economy, and our wallets.

Canada should be harnessing the power of green energy, something other countries around the world are already doing to create good jobs and help the environment. We need to build a strong green energy future, one that isn't mired in the polluting tar sands that tip us closer to catastrophic climate change and poison our air in the process.

Our shared climate, air, water and land cannot afford the status quo and reckless plans to triple tar sands production.

**CANADIANS DESERVE BETTER.
SO DOES OUR AIR.**

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