

The Royal Society of Canada has released a report on the merits of oil sands development in relation to environmental and health impacts.

ROYAL SOCIETY OF CANADA MAJOR FINDING

Feasibility of reclamation:

Reclamation is not keeping pace with the rate of land disturbance but research indicates that sustainable uplands reclamation is achievable and ultimately should be able to support traditional land uses.

GOVERNMENT OF ALBERTA (GOA) ON RECLAMATION

- It takes time before space is available for reclamation, but some of the region's original mines are now at the stage where we are seeing considerable reclamation, including tailings ponds such as Suncor's Pond 1.

Enhanced tracking:

- An enhanced system for tracking and reporting of milestones associated with disturbance and reclamation has been developed.
- The system will ensure better clarity for industry, government, and the public.
- Industry will be required to report greater detail on reclamation progress.
- Better reporting will also increase the ability to measure and report performance against reclamation plans and give the province the ability to cross-reference security information against mine liability and reclamation status.
- Incremental implementation of the reporting system began in 2010, and it is expected to be fully developed by early 2012.

Reclamation certification:

- The province's reclamation certification policy is being updated. The main objectives of the new policy will be to:
 - provide clarity to industry, stakeholders and First Nations of regulatory requirements, regulatory timelines, reclamation standards, application content, and expectations in advance of application for reclamation certification; and
 - provide an appropriate framework for assessing reclamation performance and outcomes to reclamation objectives.

Increased transparency:

- To increase public transparency, an online Oil Sands Information Portal is being developed to show the amount and age of reclamation and other information and data associated with oil sands development.
- The web portal is expected to be online in early 2011 and will illustrate that considerable areas of land have already been reclaimed and are now being monitored for sustainability.

ROYAL SOCIETY OF CANADA MAJOR FINDING

Adequacy of financial security:

Current practices for obtaining financial security for reclamation liability leave Albertans vulnerable to major financial risks.

GOA ON FINANCIAL SECURITY FOR RECLAMATION LIABILITY

- The mine financial security program was originally created to ensure Albertans never have to foot the bill for reclamation – new improvements will continue to ensure this is the case.
- As industry has matured, so has reclamation knowledge. Alberta's mine security program needs to evolve to better address both current understandings and shortcomings.
- Alberta Environment currently has a progressive reclamation Ministerial Report moving through government which, if approved, would revamp the financial security program and address concerns raised by the Auditor General, the Royal Society of Canada, and others.

ROYAL SOCIETY OF CANADA MAJOR FINDING

Impacts of oil sands contaminants on downstream residents:

There is currently no credible evidence of environmental contaminant exposures from oil sands reaching Fort Chipweyan at levels expected to cause elevated human cancer rates. More monitoring focused on human contaminant exposures is needed to address First Nation and community concerns.

GOA ON IMPACTS ON DOWNSTREAM RESIDENTS

- Alberta Health and Wellness is closely monitoring the potential health impact of environmental contaminants from the oil sands operations. Ongoing health surveillance, disease prevention and health protection initiatives are in place to ensure that the health of all Albertans in the lower Athabasca region is protected from adverse health effects.
- Examples of health surveillance activities in the oil sands region include:
 - The Northern River Basins Human Health Monitoring Program, 1994 – 2004.
 - The Alberta Oil Sands Community Exposure and Health Effects Assessment Program, 1998 – ongoing.
 - The Alberta Biomonitoring Program, 2006 – ongoing.
- Based on the concentration of environmental contaminants, exposure assessment, and biomonitoring data, the level of air, water, and traditional food (e.g., fish, moose, deer) contaminants in the oil-sands region has been found to be low, in fact well below existing health guidelines.
- One exception has been mercury levels in certain species of fish. However, mercury is naturally occurring in many parts of Alberta, and this problem is in fact more prevalent in the southern part. Appropriate food consumption advisories have been issued for mercury in the impacted areas and are being updated as and when required.

- Based on the existing information, Alberta's Chief Medical Officer of Health is of the view that there is insufficient evidence to link the incidence of cancer in the lower Athabasca region to environmental contamination from oil sands operations.
- As a follow-up to media reports of increased cancer rates in Ft. Chipewyan, The Government of Alberta is fully committed to working with the people of Ft. Chipewyan to create a participatory, community-based health study that could provide answers to their health concerns.
- Community leaders will play a key role in overseeing the proposed study and ensuring the results can have a positive impact on the health of the community.

ROYAL SOCIETY OF CANADA MAJOR FINDING

Impacts on population health in Wood Buffalo:

There is population level evidence that residents of the Regional Municipality of Wood Buffalo (RMWB) experience a range of health indicators, consistent with "boom town" impacts and community infrastructure deficits, which are poorer than those of a comparable Alberta region and provincial averages.

GOA ON IMPACTS ON POPULATION HEALTH IN WOOD BUFFALO

- Alberta Health and Wellness and Alberta Health Services closely monitor the health of the population in Alberta.
- The health status of the population in the Regional Municipality of Wood Buffalo is somewhat lower than the rest of the Alberta population, although comparable to other parts of Northern Alberta (e.g., North Western Alberta), where higher rates of diabetes, hypertension, renal failure, and injury are top public health concerns in many aboriginal communities.

ROYAL SOCIETY OF CANADA MAJOR FINDING

Impacts on regional water supply:

Current industrial water use demands do not threaten the viability of the Athabasca River system if the Water Management Framework developed to protect in-stream, ecosystem flow needs is fully implemented and enforced.

GOA ON REGIONAL WATER SUPPLY

Athabasca River Water Management Framework:

- As the Royal Society of Canada report points out: strict limits are placed on industry's water use. These limits are fully-implemented and, as noted by the report, ensure sustainability of the aquatic system.
- All existing and approved oil sands projects may withdraw no more than three per cent of the average annual flow of the Athabasca River, currently they use less than one per cent of the river.
- The Athabasca River Water Management Framework sets mandatory limits on withdrawals that maintain flows at or near natural conditions.
- To protect local habitats, the framework puts a weekly cap on the amount of water companies can withdraw according to the fluctuating flow of the river.

- The Athabasca River Water Management Framework will be entering Phase 2, with public consultations expected in upcoming months.
- Input from stakeholders, Albertans and residents will guide implementation of Phase 2.

ROYAL SOCIETY OF CANADA MAJOR FINDING

Impacts on regional groundwater quantity:

The regional cumulative impact on groundwater quantity and quality has not been assessed.

GOA ON REGIONAL GROUNDWATER QUALITY

Groundwater and surface water frameworks:

- Alberta Environment is leading the development of groundwater and surface water frameworks for the Athabasca region.
- This includes groundwater mapping, vulnerability assessments, and the development of outcomes with established targets and thresholds for water quantity and quality.
- The development of groundwater management frameworks for the Athabasca, South Athabasca and Cold Lake oil sands regions and Industrial Heartland is underway as part of a large initiative to manage cumulative effects.
- The draft groundwater management frameworks for the Athabasca (mineable) and South Athabasca (in situ) Oil Sands regions have been completed.
- The draft groundwater management framework for the Cold Lake Oil Sands Region is complete.
- Alberta Environment has completed the Muskeg River Water Management Framework that includes water quantity and quality objectives for the Muskeg River.
- A comprehensive monitoring and surveillance program was initiated two years ago to support the Muskeg River Water Management Framework. The first annual performance report is available, the second is nearing completion.

Royal Society of Canada findings:

- Unfortunately, the Royal Society of Canada did not have details of the province's water management frameworks for groundwater and surface water available for its review.
- Where the Royal Society of Canada has indicated a lack of groundwater mapping, Alberta Environment has completed a mapping assessment of groundwater quantity and quality in the lower Athabasca Region consisting of over a quarter million sampling points.
- This is a world-class database that will be made available with the finalization of the groundwater management framework under the Lower Athabasca Regional Plan.

ROYAL SOCIETY OF CANADA MAJOR FINDING

Impacts on regional water quality:

Current evidence on water quality impacts on the Athabasca River system suggests that oil sands development activities are not a current threat to aquatic ecosystem viability. However, there are valid concerns about the current Regional Aquatics Monitoring Program (RAMP) that must be addressed.

GOA ON REGIONAL WATER QUALITY

- To protect the quality of river water, no water used in the extraction of bitumen can be returned to the river and is, instead, stored in tailings ponds.

Monitoring:

- Alberta has monitored water quality in the oil sands region since the early 1970s.
- Today, water monitoring has expanded to include staff who monitor, approve and ensure compliance of projects as well as consultants and multi-stakeholder groups that continuously assess water quality.
- The Alberta government monitors in a number of ways:
 - continually monitoring the Athabasca River and its tributaries at 11 sites throughout the oil sands region;
 - auditing the monitoring data that oil sands operators are legally required to provide;
 - participating in the Regional Aquatics Monitoring Program – more than 100 water quality stations in the region; and
 - evaluating current contaminant load concentrations and comparing to historic conditions.
- The Athabasca River has always had measurable levels of naturally-occurring contaminants.
- This is because bitumen from exposed oil sands along the river banks seeps naturally into the surface water as it cuts through the landscape.
- Monitoring stations downstream of mine sites show industrial contribution is small and has no measurable impact on water quality at the rivers mouth (Old Fort monitoring site).
- Operators are licensed to release water from drainage of lands to creeks and tributaries in the region in preparation for oil sands mining; there is also one licensed wastewater discharge in the Athabasca River.
- These licences are in public approvals, and releases are monitored to ensure there is no significant impact on the Athabasca River downstream of the mine sites.
- The Royal Society of Canada recommends enhanced government surveillance of surface waters. Government recognized this same need and responded two years ago with the implementation of the Muskeg River Water Management Framework and the Comprehensive Contaminant Load Study.

Contaminant load study:

- A three-year (2009-2012) comprehensive contaminant load study is underway. It is examining the effects of air emissions, land disturbance, drainage and the potential for seepages or spills.
- This detailed study and data compilation will for the first time quantify the amount, extent and impact of natural and industrial load sources.
- Findings and analyses will be submitted to peer-reviewed journals.
- The overall goal is to address the potential impacts of oil sands operations on human and ecosystem health, while determining the proportion of contamination from industry versus what is already naturally in the landscape.
- The study has air, land and water components.
- Initial results from the Contaminant Load Study continue to demonstrate that contaminants are both anthropogenic (from industry) and naturally-occurring.
- The proportion of anthropogenic versus natural contamination is one focus of the study.
- While initial results are consistent with previous studies indicating the majority of the contaminant load is natural from erosion, Alberta will remain vigilant in its monitoring efforts.

Regional Aquatics Monitoring Program (RAMP):

- This comprehensive network of over 100 monitoring stations was designed by a team of independent scientists.
- It exists because industry is required by law to monitor and report findings to government.
- Data is used to address long-term regional changes; it complements site-specific data required through approvals.
- RAMP periodically undertakes a scientific peer review of the entire program.
- Reviews are conducted to obtain an independent evaluation of the monitoring design and whether it is meeting the objectives of the program and the needs of local stakeholders.
- The most recent review is expected to be completed by the end of the year.
- The last peer review (2004) triggered more than 60 improvements in RAMP's monitoring practices – we expect the current review will trigger more.

Monitoring data review:

- The Alberta government has struck a six-member committee of independent scientists to review water monitoring data collected from the oil sands region.
- The committee will report back to government in February 2011 on the relevance of any differences and gaps that may exist between government and academic research findings.
- If the review identifies any gaps in the province's water monitoring data, government will make the necessary corrections.

ROYAL SOCIETY OF CANADA MAJOR FINDING

Tailings pond operation and reclamation:

Technologies for improved tailings management are emerging but the rate of improvement has not prevented a growing inventory of tailings ponds. Reclamation and management options for wet landscapes derived from tailings ponds have been researched but are not adequately demonstrated.

GOVERNMENT OF ALBERTA (GOA) ON TAILINGS

Increased tailings performance:

- As an initial step in reducing the inventory of fluid tailings, the Energy Resources Conservation Board developed new tailings management regulations and released them on February 3, 2009.
- The Government of Alberta is actively exploring policy and regulatory tools which will support reduced tailings production and faster reclamation and closure of tailings.
- The province is also developing a Tailings Management Framework that will lay the groundwork for an assertive plan to deal with pre-existing, or legacy, tailings.
- Performance criteria will be used to minimize the environmental impact of tailings storage and to encourage quicker reclamation of legacy tailings.
- In addition, a number of oil sands operators recently announced plans to work together in a cohesive effort to advance tailings management practices.

Research:

- \$4.5 million from the Energy and Innovation Fund has been provided to the School for Energy and Environment at the University of Alberta to fund reclamation and tailings research in support of progressive reclamation.
- The province also awarded \$25 million to the Helmholtz Alberta Initiative at the University of Alberta to support research into the sustainable use of oil sands resources. It is a partnership between the University of Alberta and the Helmholtz Association of German Research Centre's. The initiative will explore the key issues encountered when advancing the sustainable development of Alberta's oil sands.

ROYAL SOCIETY OF CANADA MAJOR FINDING

Impacts on ambient air quality:

The current ambient air quality monitoring data for the region show minimal impacts from oil sands development on regional air quality except for noxious odour emission problems over the past two years. Control of NOx emissions and regional acidification potential remain valid concerns.

GOA ON AMBIENT AIR QUALITY

Monitoring:

- Air quality in the Fort McMurray area is monitored 24 hours a day, 365 days a year.

- Alberta's Air Quality Index shows that air quality in the oil sands area rates as "good" – the highest possible rating – at least 95 per cent of the time.
- Government ensures that sophisticated and comprehensive tools are used to monitor and ensure good air quality.
- There are 16 continuous full-time stations in the oil sands region and 42 passive industrial monitoring sites. The province also has a mobile unit that can be sent to "hot spots" when required.
- The Government of Alberta regularly audits monitoring stations and data throughout the region to ensure our data is accurate.
- The Government of Alberta responds to every air quality complaint it receives.

H₂S exceedances:

- Alberta has an hourly air quality objective for hydrogen sulphide (H₂S) that allows us to detect and address H₂S exceedances.
- The Government of Alberta holds facility operators accountable for finding the root cause of H₂S exceedances and the best way to mitigate them.
- The majority of exceedances have occurred near specific facilities and away from populated areas.
- The province holds industry accountable for emissions through regulations and approvals. Environmental Protection Orders may be issued in instances of noncompliance, which require industry to solve air quality issues.

Odour issues:

- We recognize that odour issues can affect quality of life.
- That is why the province has put significant resources into addressing the concerns raised by communities in the oil sands.
- As a regulator, we are holding operators accountable for finding the root cause and dealing with them.
- An environmental protection order is in place in the region.
- There has been some positive progress made by industry; however, we will continue our efforts until this issue is fully solved.

Acid deposition:

- Alberta has had a sampling program for acid deposition in place for 30 years.
- The study looks at impacts to 50 regional lakes and several soil plots.
- Sampling indicates there are no significant trends in impacts on soils in the area.
- The study is partnered with independent academic researchers. These academics have published extensive work in the area.
- The Wood Buffalo Environmental Association Terrestrial Environmental Effects Monitoring program has a number of initiatives underway including sensitive receptor (lichen) mapping, improvements to modeling, and passive monitoring to provide further information regarding deposition in the region.

NOx Emissions:

- In 2007 government introduced emissions guidelines for NOx emissions based on a review of best available technology economically achievable which are currently being used in approvals for some operators.
- The purpose of the guideline was to update NOx emissions for stationary sources such as boilers, heaters, and turbines.
- Since mobile mine fleets are also a significant source of NOx emissions. Government is requiring, through approvals, operators to:
 - minimize all NOx emissions from all mine mobile equipment where practicable; and
 - implement procedures to ensure all new and replacement mining vehicles and engines are equipped with effective emission control technology that meets, at minimum, the latest United States Environmental Protection Agency emission standards for off-road heavy-duty diesel vehicles.

Industrial emissions (province-wide):

- Alberta recognizes that strong economies, especially those powered by the oil and gas sector, will produce more air emissions.
- Within the oil sands region North of Fort McMurray, more stringent requirements on emissions of oxides of nitrogen are being implemented for new equipment. These are the most stringent in the province.
- The Government of Alberta is actively involved in the national initiatives to improve performance standards across industry sectors and local air quality.
- We are requiring the electricity sector to cut nitrogen dioxide emissions and sulphur dioxide emissions up to 50 per cent by 2025, and submit plans to capture 70 per cent of mercury emissions from coal fired power plants.
- Government has also approved plans to manage emissions of particulate matter and ozone and to reduce the impact of acid deposition.
- Alberta will continue to encourage efforts to improve technology and innovation, which will help reduce industrial air emissions over the long-term.

ROYAL SOCIETY OF CANADA MAJOR FINDING

Impacts on greenhouse gas emissions (GHG):

Progress has been made by the oil sands industry in reducing its GHG emission per barrel of bitumen produced. Nonetheless, increasing GHG emissions from growing bitumen production creates a major challenge for Canada to meet our international commitments for overall GHG emission reduction that current technology options do not resolve.

GOA ON GREENHOUSE GAS EMISSIONS (GHG)

- Although per barrel greenhouse gas (GHG) emissions in the oil sands continue to decrease – the industry has reduced GHG emissions per barrel of oil produced by an average of 39 per cent since 1990, with some facilities achieving reductions as high as 45 per cent – overall emissions will grow as production increases to meet a growing global demand for energy.
- Alberta is regulating GHG emissions in the oil sands region by being the only jurisdiction in North America with mandatory reduction targets for large emitters across all sectors.
- Our program includes a price on carbon, a regulated offset market, and a clean energy technology fund.
- Large emitters – those that emit more than 100,000 tonnes per year – must meet mandatory reduction targets. This includes industrial emitters in the oil sands region.
- Emitters unable to meet the target must pay \$15 per tonne into a clean energy technology fund.
- These actions are achieving real results. In total, since the start of program:
 - more than 17 million tonnes of GHGs has been reduced from business as usual; and
 - \$187 million has been paid into our clean energy technology fund – with \$71 million of that already invested.
- The province has committed \$2 billion to carbon capture and storage, with two of four commercial scale projects associated with reducing emissions from oil sands production.
- With Alberta's carbon price as an incentive, oil sands facilities are also encouraged to adopt eco-industrial processes such as co-generation and the use of off-gases for petrochemical products rather than combustion; thereby helping to reduce emissions beyond the sector.

ROYAL SOCIETY OF CANADA MAJOR FINDING

Environmental regulatory performance:

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 EIA 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.

GOA ON ENVIRONMENTAL REGULATORY PERFORMANCE

- A review of the current Environmental Assessment process has begun.
- The shift to a cumulative effects management system within Alberta Environment and the provincial implementation of the Land-use Framework, including the development of regional plans, makes such a review necessary.

- Alberta Environment is leading an initiative that is looking at a variety of regulatory enhancements related to the current environmental assessment process to support the shift to a cumulative effects management approach and to improve overall effectiveness and efficiency of regulatory process.
- A review of environmental assessment practices employed in jurisdictions outside of Alberta has led government to conclude that regional strategic assessment, also known as regional strategic environmental assessment, holds the greatest promise for improving cumulative effects assessment in the province and for supporting cumulative effects management.
- The work done by the Canadian Council of Ministers of the Environment in 2009 on regional strategic assessment is strongly influencing provincial direction.
- Currently, government is working to:
 - implement the environmental cumulative effects management system within Alberta Environment;
 - streamline the current regulatory system for upstream oil and gas, including in-situ oil sands, through collaboration and coordination within government and externally with stakeholders; and
 - develop and implement an efficient, integrated natural resource regulatory system that maintains environmental protection while providing excellent service to industry.
- Any changes in policy will reflect the new focus on cumulative effects management on a regional scale and improve overall efficiency and effectiveness of project environmental impact assessments.