



THE OIL SANDS
DEVELOPERS GROUP

Energy From Athabasca

Facts on Oil Sands and the Environment

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History and Context

- The oil sands industry is ~ 45 years old
 - 1/2 the average return period for forest fires in the region (80 years)
 - Approx. 1/4 the time required to develop old growth forest
- Significant change in environmental awareness over that time
- At the same time, regulations have become more stringent, mitigation methods have improved and technological innovations have led to enhanced environmental performance
- Until mid-1990's, only two operating oil sands facilities



Today

- Today 4 mine projects are operational, several are under construction of expansion, and several more are in the regulatory process
- At least 10 in situ facilities are operational and many more are in the planning phase
- There is international awareness of the oil sands due to its strategic importance as a source of energy and the associated environmental challenges



Environmental Monitoring in the Oil Sands is World Class

- Regional environmental management utilizes multi-stakeholder, consensus based approach
- Industry, Government, Stakeholders participate
- Wood Buffalo Environmental Association (WBEA) monitors air quality and air emission effects
- Regional Aquatics Monitoring Program (RAMP) monitors water quality and aquatic ecosystem health
- Cumulative Environmental Management Association (CEMA) develops recommendations for environmental thresholds and management options for regulator consideration
- Terrestrial monitoring group being planned

The Resource

- 173 billion barrels of oil resource
- Oil sands underlie 140,200 km² of boreal forest - 4% of Canada's total boreal forest



- 20% of the resource is shallow enough for surface mining, representing 2.5% of the 140,200 km² total or 0.1% of Canada's boreal forest
- 80% will require in situ techniques for extraction
- Canada has the second largest oil reserves in the world – primarily due to oil sands
- Current oil sands production is ~50% of Canada's total oil output

The Regulatory Environment

The Regulators

- **Alberta Environment (AENV)**
 - Air, land, water, reclamation
- **Alberta Sustainable Resource Development (ASRD)**
 - Surface access, timber harvest, wildlife management
- **Energy Resource Conservation Board (ERCB)**
 - Carries out public interest test – environmental performance key to passing the test



The Regulatory Process

- **Rigorous Environmental Assessment Process**
 - Stakeholder review and input
 - Regulatory review
 - Public hearings
- **Comprehensive Project Approvals**
 - Significant monitoring and reporting
 - Required involvement in regional multi-stakeholder forums
 - Inspections and compliance reviews
 - Industry is accountable for its commitments and regulatory requirements
- **Approval renewals every 10 years**

The Regulations – Air

- Alberta Ambient Air Quality Objectives (AAAQO) are some of the most stringent in the world
- Best Available Technology Economically Achievable (BATEA) requirements for all new facilities
- All project applications require extensive predictive air modeling including application and cumulative case
- Alberta was the first jurisdiction in Canada with green house gas regulations and the first in North American to legislate industrial GHG reductions
- Approval conditions require participation in Wood Buffalo Environmental Association
- Multiple regulatory authorities for source air emissions and ambient air quality (e.g. ERCB – sulphur, CCME – NOx emissions, AENV – AAAQO)

The Regulations – Water

- Alberta water quality guidelines are consistent with other jurisdictions and regulatory agencies (e.g. EPA)
- Alberta Environment and the Department of Fisheries and Oceans (DFO) have developed a Water Management Plan for the lower Athabasca River
- Water licences are subject to the withdrawal limitations in the Water Management Plan
- Regulatory approvals require participation in RAMP or similar level of aquatic monitoring
- Multiple regulatory authorities for water use and quality (e.g. AENV – surface water quality guidelines, DFO – fish habitat)

The Regulations – Land

- Oilsands reclamation challenges are unique in the world;
 - Liquid tailings
 - Pit Lakes
- Alberta has developed reclamation guidelines specifically for the oil sands as there is no analogue elsewhere in the world
- Regulatory approvals require participation in reclamation research through Canadian Oil Sands Network for Research and Development (CONRAD) or Cumulative Environmental Management Association (CEMA)
- Multiple regulatory authorities for land (AENV – reclamation and closure, ASRD – surface land access, timber)

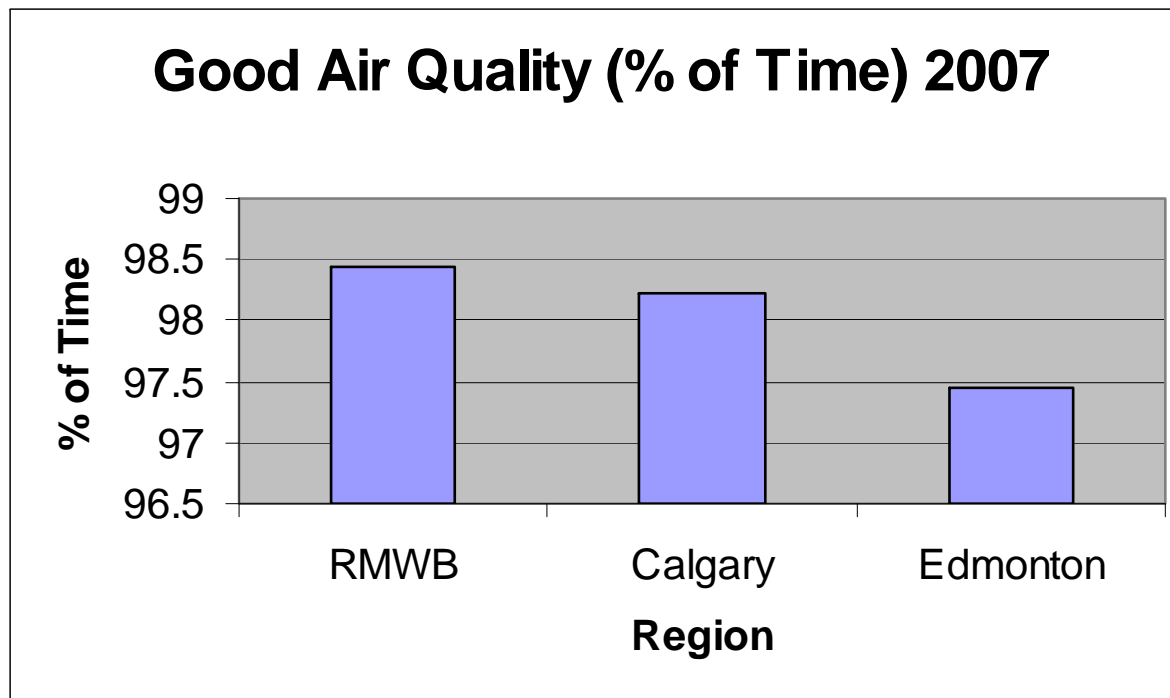
The Regulations – Reporting

- Extensive monthly and annual reporting requirements as regulatory approval conditions
- Monitoring data are reviewed every 10 years as part of the approval renewal cycle
- ***Any*** potential approval contraventions must be reported ***immediately*** to regulatory agencies

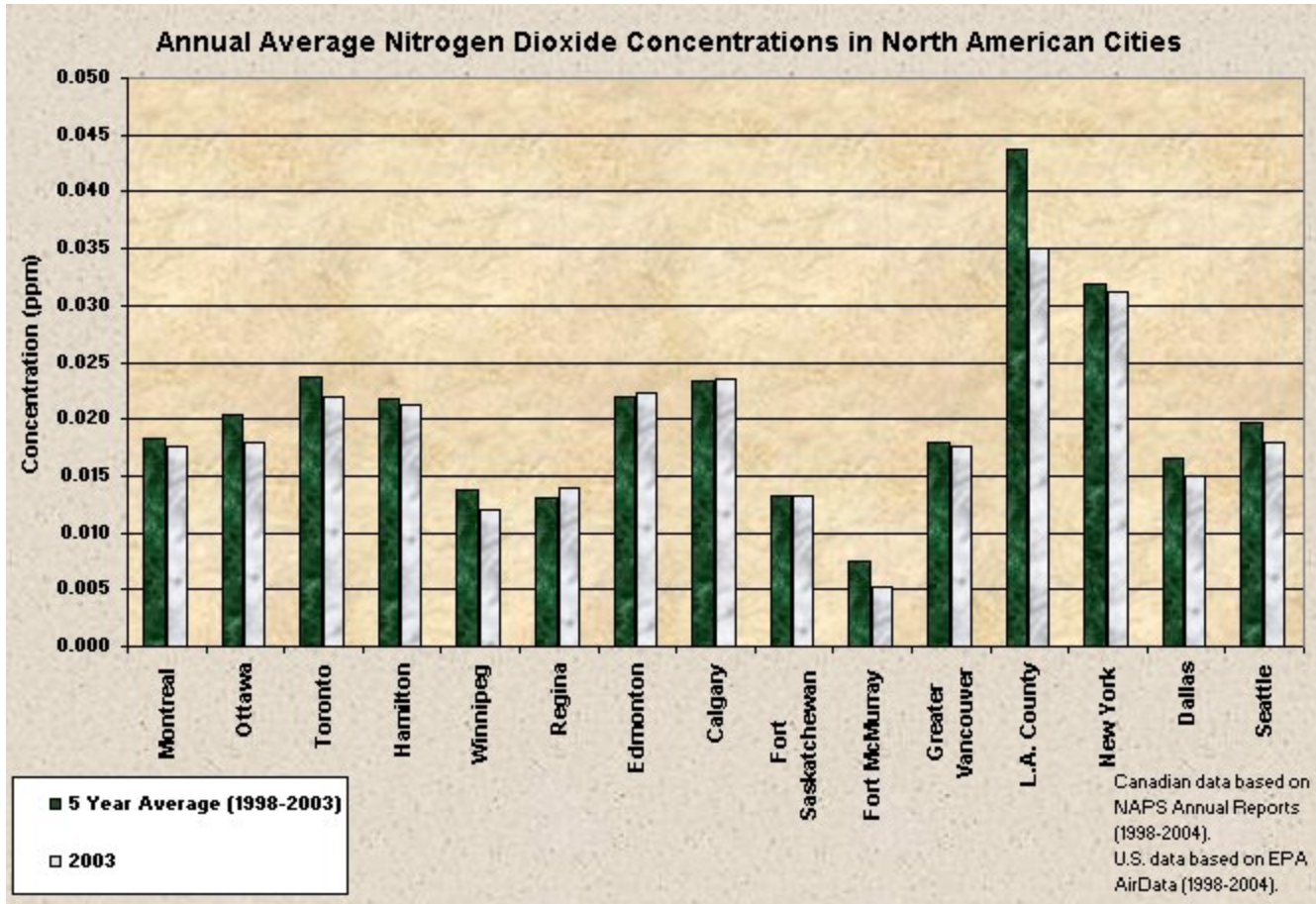
The Air

Air Quality

- Air quality in Alberta is generally rated as “Good”
- Air quality in the Regional Municipality of Wood Buffalo (RMWB) is as good or better than other Alberta urban centers such Calgary and Edmonton

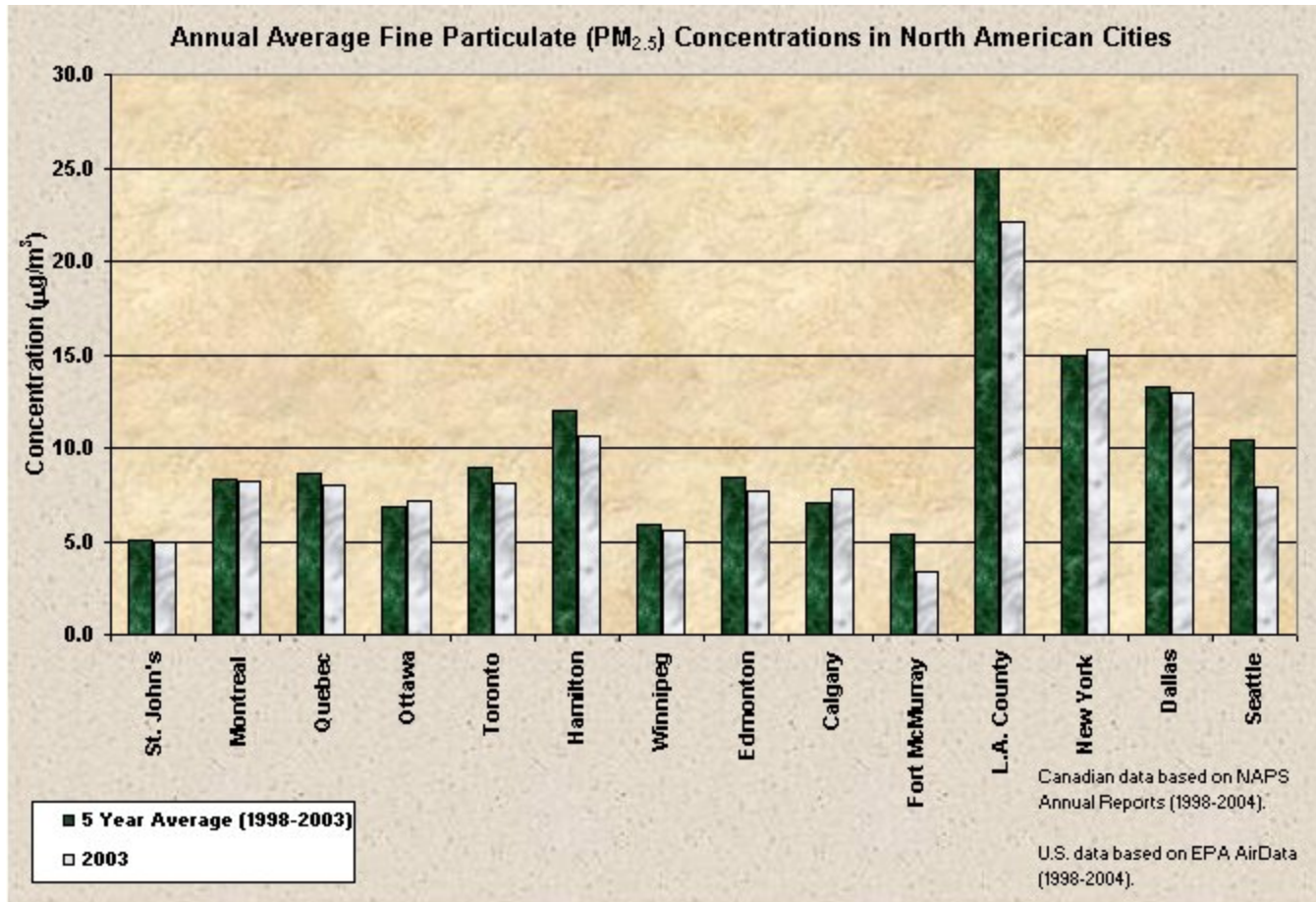


NO₂ Levels in the Oil Sands region are better than most areas of North America



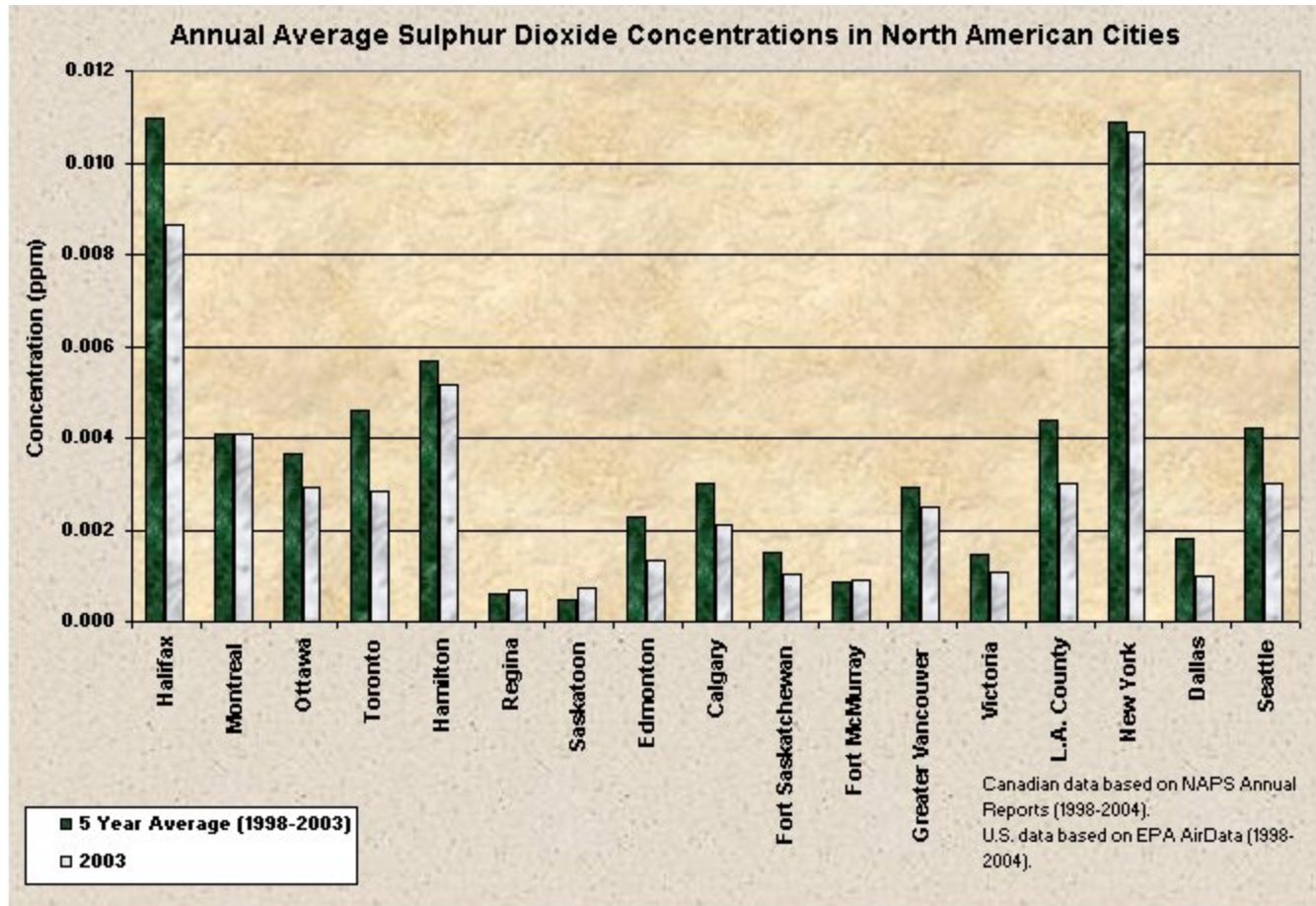
Source: <http://www.casadata.org/comparison/index.asp>

PM Levels in the Oil Sands region are better than most areas of North America



Source: <http://www.casadata.org/comparison/index.asp>

SO₂ Levels in the Oil Sands region are better than most areas of North America



Source: <http://www.casadata.org/comparison/index.asp>

Air Quality Monitoring

- The Wood Buffalo Environmental Association monitors air quality in the Wood Buffalo region
- WBEA operates 14 air monitoring stations – real time data available on WBEA website 24/7 – likely the most extensive air monitoring system in North America
- <http://www.wbea.org/content/view/56/111/>
- WBEA carries out terrestrial air effects monitoring program and human exposure monitoring
- WBEA is a multi-stakeholder association that includes industry, government and stakeholders
- The Wood Buffalo region has 10 times the number of air monitoring stations per capita than the US (14 per 85,000 population in Wood Buffalo vs. 5,000 per 300,000,000 in the U.S.)

Air Quality Monitoring Stations



Air Emission Effects Monitoring

- WBEA Terrestrial Environment Effects Monitoring (TEEM) monitors;
 - Acid deposition
 - Nitrogen effects (eutrophication)
 - Traditional resources
- Regional Aquatics Monitoring Program (RAMP) monitors lake acidification
- Throughout 15 years of monitoring, no significant acid deposition effects or eutrophication has been observed

The Water

Water Quality



- Water Quality in the Athabasca River reflects the geology of the banks and beds which run through areas of naturally exposed oil sands in the Fort McMurray area
- Bitumen seeps naturally from the banks into the river – this is how the oil sands were first discovered by local Aboriginal people and early explorers
- The ecosystem of the Athabasca River has developed around the chemistry of the water and substrate

Water Monitoring



- RAMP has monitored water quality and aquatic ecosystem health in the Wood Buffalo region for 12 years
- No detectable regional changes in aquatic resources related to oil sands development in that time
- Localized effects that may relate to oil sands development have been noted

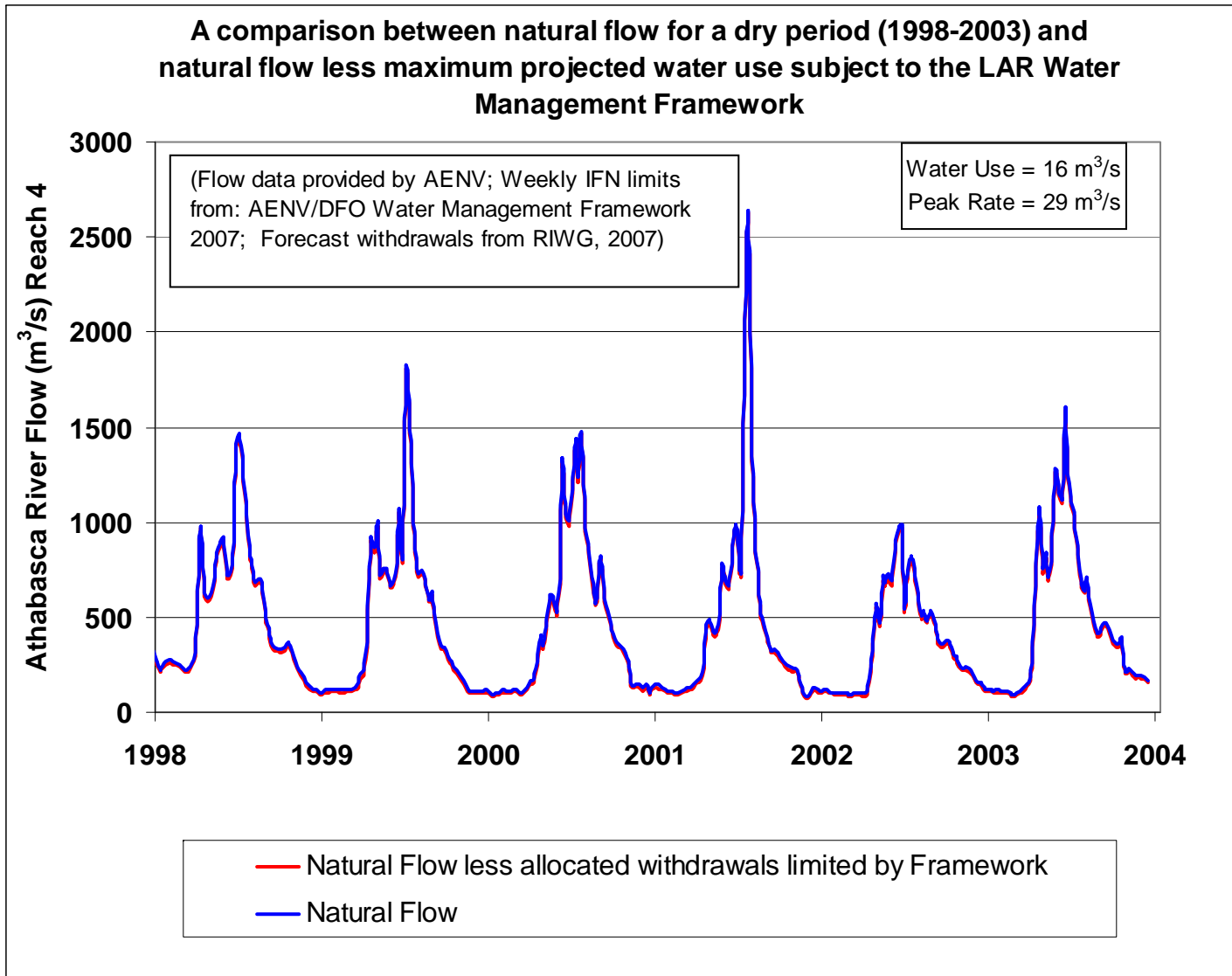
Water Quantity – Facts

- 131 billion m³ of water flows out of Alberta each year
- 85% of the water flows north
- The Athabasca River represents 17% of Alberta's supply (23 billion m³)
- All the river basins summed together south of the Athabasca River account for 15% of Alberta's water supply
- 88% of water allocation is from these southern river basins
- The total amount of water allocated to the oil and gas sector for the Athabasca River is 2.2% of natural flow

Water Quantity – Facts

- The Athabasca is ice covered for 5-6 months per year
- Winter flows are about 10 times lower than open water flows
- Athabasca flows are not regulated by dams
- The oil sands industry is not seasonal
- Concerns about withdrawals during low winter flow weeks
- Withdrawals during low flow periods have been capped (AENV and DFO in the *Water Management Framework: Instream Flow Needs and Water Management System for the Lower Athabasca River, Feb, 2007*)

Water Quantity – Facts



The Land



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Perspective

- Oil sands underlie 140,200 km² of boreal forest - 0.1% of Canada's total boreal forest
- 20% of the resource is shallow enough for surface mining, representing 2.5% of the 140,200 km² surface area or 0.01% of Canada's boreal forest
- 43,840 km² of the boreal forest within Alberta is protected (Provincial Parks, Wildlands, etc.)

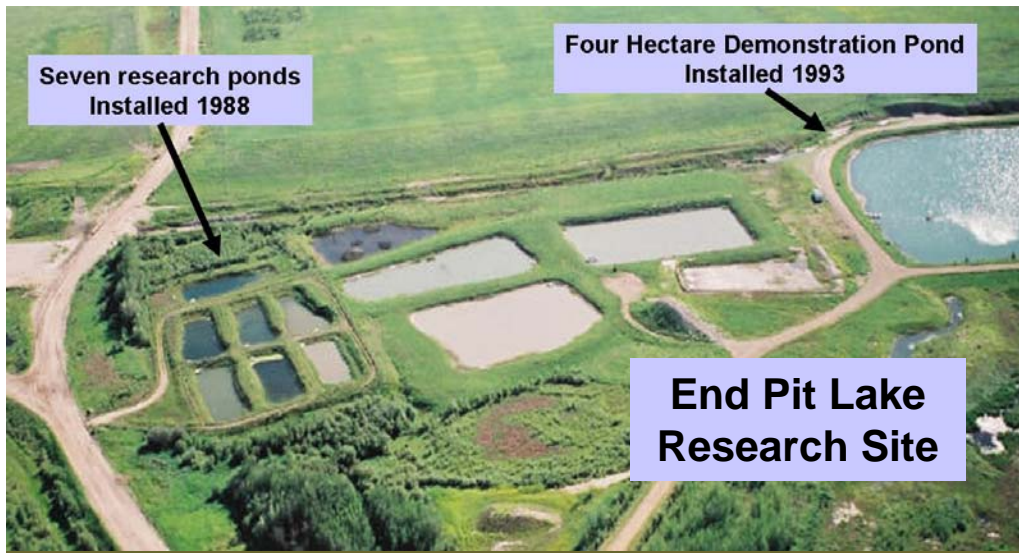
Disturbed vs. Reclaimed vs. Certified

- ~ 530 km² of land disturbed (2008)
- ~ 65 km² of land reclaimed (2008)
- 1.04 km² certified (2008)
- All land available for reclamation is reclaimed – progressive reclamation
- Much of the reclaimed land is adjacent to or part of on-going operations
 - Public access to land adjacent to on-going operations represents a safety concern, therefore, operators are unable to relinquish tenure - no ability to certify
- Tailings ponds account for large areas of the disturbance and are operational for 30+ years
- First tailings pond completely reclaimed by 2010
- First End Pit Lake in 2012



On-going Research

- Reclamation research activities have been underway since the 1960s
- Thousands of research reports, theses, field sites, etc. since that time
- Up to 10 universities and dozens of researchers involved at any time



The Controversy

Oil Sands Industry – Focus of Attention

- Recent Media and Environmental Non-Governmental Organizations (ENGOS) reports have criticized the environmental performance of the oil sands industry
- The oil sands industry has not communicated effectively regarding:
 - Past environmental improvement & achievements
 - Current monitoring, regulation and practices
 - Future advances in processes and technology
- The oil sands industry recognizes the need to better communicate – forums like this are essential

The Reality

Work in Progress

- The oil sands industry is a relatively young industry
- For many years, a comparatively small amount of attention was paid to the oil sands – Reserves were not formally recognized until 2004



- Over time, we have continually improved our operational and environmental performance
- We will continue that course and communicate our challenges and progress

Communication

- The oil sands industry strives to understand and meet the challenges associated with developing the resource
- The oil sands industry is aware it needs to improve communications
- Stakeholder consultation, communication and collaboration is essential to future success
- We are open to your comments and suggestions
- For additional information:

www.oilsandsdevelopers.ca

<http://www.canadasoilsands.ca/en/>

OSDG member company websites

Thank You

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Disclaimer

This presentation contains forward-looking information. Actual results could differ materially due to market conditions, changes in law or government policy, changes in operating conditions and costs, changes in project schedules, operating performance, demand for oil and gas, commercial negotiations or other technical and economic factors.

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