ALBERTA OIL SANDS INDUSTRY QUARTERLY UPDATE

SPRING 2009

(Reporting on the period: Feb. 2, 2009 to Mar. 23, 2009)

Alberta Government

All about the oil sands

Background of an important global resource

TABLE OF CONTENTS

Alberta has the second-largest deposit of oil in the world—only Saudi Arabia can claim a larger stockpile of crude. But 173 billion of Alberta's 179 billion barrels of oil have the special quality of being bitumen, a resource that has been developed for decades but is only now coming into the forefront of the global energy industry, as conventional supplies—so-called "easy" oil—continue to be depleted. The figure of 173 billion barrels represents what is considered economically recoverable with today's technology, but with new technologies, this reserve estimate could be increased to as much as 315 billion barrels.

There are three major bitumen (or oil sands) deposits in Alberta. The largest is the Athabasca deposit, located in the province's northeast in the Regional Municipality of Wood Buffalo. The main population centre of the Athabasca deposit is the City of Fort McMurray. The second-largest oil sands deposit is referred to as Cold Lake, just south of Athabasca, with the main population centre the City of Cold Lake. The smallest oil sands deposit is known as Peace River, which is located in northwest central Alberta. A fourth deposit called Wabasca links to the Athabasca and is generally lumped in with that area.

The existence of bitumen in Alberta has been known for a long time. The first mention of it in Canadian history was in 1719, when a Cree named Wapasu brought a sample of the "gum" to a Hudson's Bay trading post. First Nations in what is now the Wood Buffalo area had traditionally used the bitumen, which seeps from outcrops along the Athabasca River, to waterproof their canoes.

Today bitumen is produced as an energy source by two means—mining and in situ. The majority of oil sands production is done by surface mining, but this will likely change in the future, as 80 per cent of Alberta's bitumen deposits are too deep underground to economically employ this technology.

Right now there are essentially two commercial methods of in situ (Latin for "in place," essentially meaning wells are used rather than trucks and shovels). In cyclic steam stimulation (CSS), high-pressure steam is injected into directional wells drilled from pads for a period of time, then the steam is left to soak in the reservoir for a period, melting the bitumen, and then the same wells are switched into production mode, bringing the bitumen to the surface.

In steam assisted gravity drainage (SAGD), parallel horizontal well pairs are drilled from well pads at the surface. One is drilled near the top of the target reservoir, while the other is drilled near its bottom. Steam is injected into the top well, a steam chamber forms, and via gravity, the melted bitumen flows into the lower well and is pumped to the surface using artificial lift.

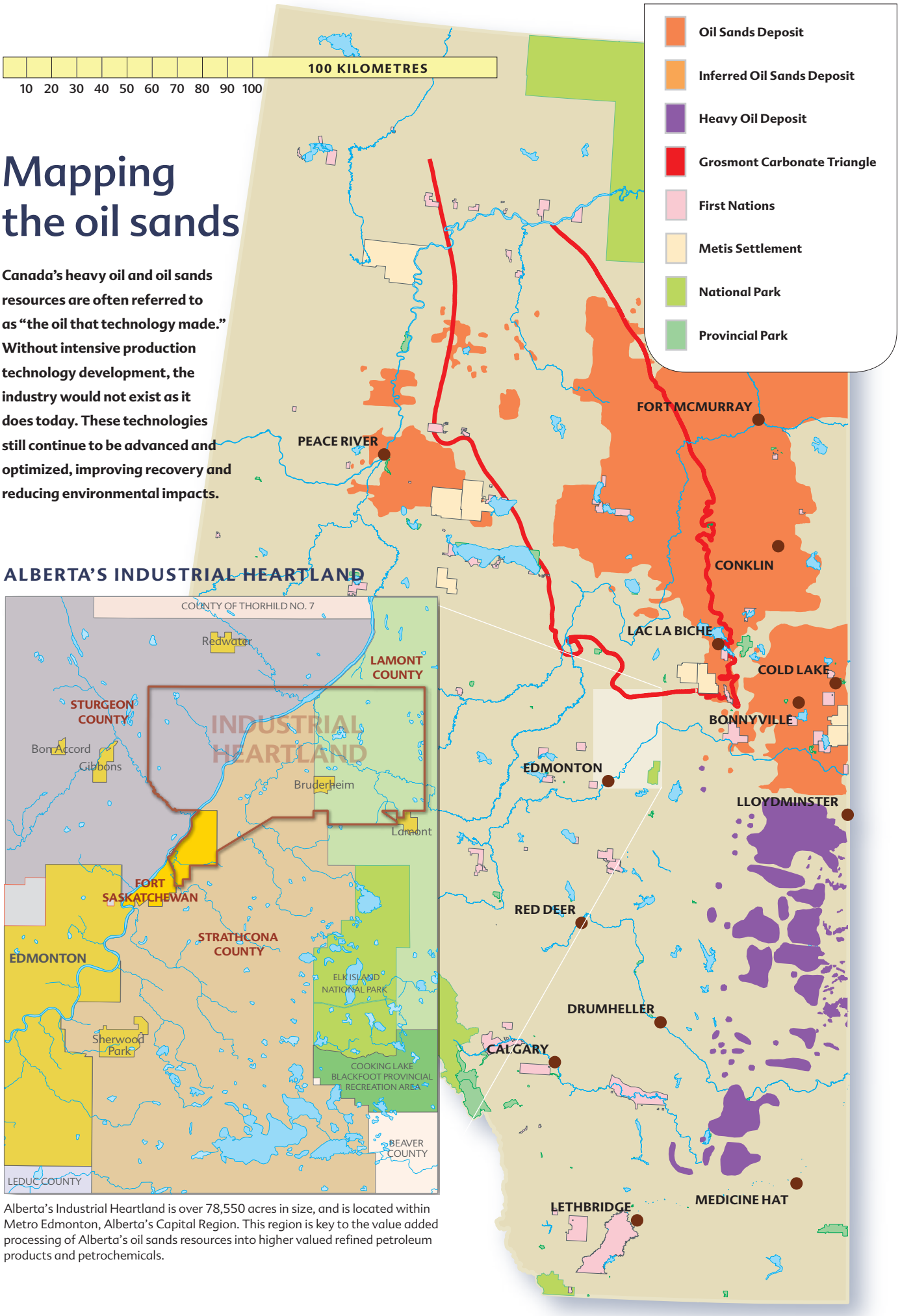
Both SAGD and CSS are used in the Cold Lake and Peace River deposits, while SAGD is the in situ technology of choice in the Athabasca deposit. The choice is based on a number of things including geology. The technologies combined currently produce just over one million barrels per day.

Research is underway on a number of other production technologies designed to optimize production and minimize water and energy use, including vapour extraction (VAPEX), and a form of in situ combustion known as toe to heel air injection (THAI).

Bitumen that has not been processed, or "upgraded," can be used directly as asphalt. It must be diluted to travel by pipeline. Adding value, some producers upgrade their product into synthetic crude oil (SCO), which is a refinery feedstock. At these refineries it can be transformed into transportation fuels and other products. •

Mapping the oil sands

Canada's heavy oil and oil sands resources are often referred to as "the oil that technology made." Without intensive production technology development, the industry would not exist as it does today. These technologies still continue to be advanced and optimized, improving recovery and reducing environmental impacts.



Alberta's Industrial Heartland is over 78,550 acres in size, and is located within Metro Edmonton, Alberta's Capital Region. This region is key to the value added processing of Alberta's oil sands resources into higher valued refined petroleum products and petrochemicals.

Government update

In February, the Government of Alberta released its 20-year strategic plan for Alberta's oil sands, which aims to reduce the industry's environmental footprint, optimize economic growth, and improve the quality of life in Alberta's oil sands regions. *Responsible Actions: A Plan for Alberta's Oil Sands* outlines an integrated approach for all levels of government, industry, and for communities to address the economic, social, and environmental challenges and opportunities in the oil sands regions. In the near term, it identifies priority actions, some of which are already underway, to address immediate challenges associated with oil sands development.

The plan showcases current efforts such as carbon capture and storage, and strengthens the approach for land reclamation, cumulative effects management, and environmental conservation. The plan also looks to the future to guide long-term investment in social and physical infrastructure and innovative technology, and to reduce the environmental footprint associated with oil sands development. The strategy is closely aligned with provincial and regional initiatives such as the *Provincial Energy Strategy* and the *Land-use Framework*. The strategy can be found at http://treasuryboard.alberta.ca/ResponsibleActions.cfm.

Also in February, the Energy Resources Conservation Board (ERCB) issued a directive that outlines new industry-wide criteria for managing oil sands tailings, and specific enforcement actions if tailings performance targets are not met. The *Tailings Performance Criteria and Requirements for Oil Sands Mining Schemes* directive requires operators to:

- prepare tailings plans and report on tailings ponds annually,
- reduce the accumulation of fluid tailings by capturing fines and placing them in a deposit that is trafficable, and
- specify dates for construction, use, and closure of fluid tailings ponds and file these dates with the ERCB by Sept. 30, 2009.

The same directive also contains new rules pertaining to Dedicated Disposal Areas. These are areas dedicated to the deposition of captured fines, which are more solid in composition than liquid tailings and must be trafficable and ready for reclamation five years after deposits have ceased. The new directive can be found at www.ercb.ca.

The ERCB is also working with Alberta Environment. Together they are calling for feedback from stakeholders on a draft directive, which proposes new requirements for the measurement, reporting, and use of water in thermal in situ oil sands operations that will save an estimated 220.5 million barrels of fresh water over the next 10 years. When finalized and implemented, the directive will regulate thermal in situ oil sands operations in all oil sands areas. The proposed directive will require in situ operators to limit the use of fresh and brackish water resources and maximize produced water recycling, improve the measurement and reporting of all major water streams, and minimize the disposal of water to improve water and energy efficiency and reduce the risk of contamination to water resources. This draft directive represents one step towards achieving an overall provincial target of a 30 per cent improvement in water efficiency and productivity by 2015 (from a 2005 baseline), as set out in *Water for Life: Alberta's Strategy for Sustainability*. To view the draft directive, please visit www.ercb.ca or www.environment.alberta.ca.

The Government of Alberta has announced a new three-point incentive program designed to help keep Albertans working in the province's energy sector during the current global economic slowdown.

The highlights of the province's three-point plan include the following.

1. A drilling royalty credit for new conventional oil and natural gas wells. This one-year program will provide a royalty credit of $200 per metre drilled to companies on a sliding scale based on their production levels from last year. This will ensure that the maximum benefits will be available for small and mid-sized producers, while freeing up available capital for all companies.

2 A new well incentive program, which offers a maximum five per cent royalty rate for the first year of production from new oil or gas wells. This one-year program is intended to help free up cash flow, and in turn, help provide access to the capital necessary for reinvestment by Alberta's oil and gas industry.

3 To encourage the cleanup of inactive oil and gas wells, the province will invest $30 million in a fund committed to abandoning and reclaiming old wellsites. This will reduce the environmental footprint of the energy sector by returning wellsites to their former states, while also helping to keep industry service crews at work.

Alberta Energy Research Institute (AERI) has entered into the second phase of the Hydrocarbon Upgrading Demonstration Program (HUDP). The HUDP supports selected joint Alberta government-industry initiatives to develop and demonstrate advanced technologies for upgrading Alberta's coal, bitumen, and heavy oil resources to high-value products. The first phase of the HUDP, completed in mid-2006, identified an initial set of technologies with the best potential for further development and demonstration. The second phase of the plan is to develop and demonstrate next generation "clean" upgrading technologies as they apply to Alberta hydrocarbons such as oil sands, coal, and petroleum coke. For more information about the HUDP program please visit www.aeri.ab.ca.

The 9th annual National Buyer/Seller Forum, a joint government/industry supply chain development initiative, was held in Edmonton on Feb. 10-12. Over 700 oil sands developers, manufacturers, and suppliers from across Canada and the globe met to generate new business and share best practices in the oil sands sector. Presenters included Premier Ed Stelmach, as well as Alberta oil sands industry representatives and stakeholders. Speakers shared insights on oil sands development, how it is being managed from public and private sector perspectives, and how new economic realities are affecting the industry. Alberta's oil sands strategy *Responsible Actions: A Plan for Alberta's Oil Sands* was announced at the forum. •

Other information sources of interest

The Construction Owners Association of Alberta (COAA), in cooperation with the Construction Industry Institute (CII) at the University of Texas, has been developing a benchmarking system that assesses project performance by looking at certain characteristics of capital projects in Alberta. CII has extensive experience benchmarking projects in the United States and globally. This allows comparisons to be made between Alberta projects and similar U.S. projects. Using quantitative evidence, the report dispels common myths regarding project execution in Alberta while establishing a solid footing for the future study of additional projects. The study is expected to be released sometime this spring.

In February 2009, the Canadian Energy Research Institute (CERI) released a report The Eye of the Beholder: *Oil Sands Calamity or Golden Opportunity?* The report provides insight into future production projections for the oil sands over the next decade and out to 2030, based upon several oil price projections and a global economic recovery. It also considers the impact that reduced production could have on new capital spending in Alberta. The CERI 2009 Economic Slowdown Projection indicates that $218 billion will be invested in the oil sands for new production. This is $97 billion less than previouslyprojected. Although oil sands development has been impacted by global economic downturn, investment is still significant in this part of the energy sector.

What's new in the oil sands

Key updates from Spring 2009

Suncor Energy and **Petro-Canada** have announced that they have agreed to merge.

Upon completion of the transaction, the parties have agreed the combined entity will operate corporately and trade under the Suncor name, while maintaining the strong brand presence and customer loyalty of Petro-Canada in refined products.

"This merger creates a made-in-Canada energy leader with the assets, cost structure and financial strength to compete globally," said Rick George, who is president and chief executive officer of Suncor and who will assume the same role with the merged entity. "The combined portfolio boasts the largest oilsands resource position, a strong Canadian downstream brand, solid conventional exploration and production assets, and low-cost production from Canada's east coast and internationally."

Canadian Natural Resources has announced first production of synthetic crude oil from the Horizon oil sands project. The company says that while production history is short, all operating units appear to be performing at design capacity. "In the immediate term, we will focus on stabilizing performance and filling the product tanks in preparation for blending and introducing first synthetic crude oil into the Horizon pipeline for shipment to Edmonton and ultimate sale."

At the same time, Canadian Natural reported it is reducing its 2009 capital budget by another $800 million, dropping it to $3.2 billion, down from the already-reduced $4 billion announced in November 2008.

Nexen has signed an agreement to acquire an additional 15 per cent interest in the Long Lake project and the joint-venture lands from Opti Canada. Nexen will also become operator of the upgrader.

Petrobank Energy and Resources has filed its application for the May River project with the Energy Resources Conservation Board and Alberta Environment.

May River is a 10,000 barrel per day toe-to-heel air injection (THAI) commercial demonstration project to be developed on the company's Whitesands leases located two kilometres from the current pilot project site.

Flint Energy Services says it has been awarded a multi-year construction contract to provide well pads and pipelines for cyclic steam stimulation (CSS) facilities in northeastern Alberta.

The contract is with a major oil and gas company and is valued at approximately $16 million to $18 million annually under an "evergreen term," which allows for the contract to continue into the future based on mutually agreed upon conditions.

Oil sands mining companies that trade shares in the United States can book their reserves as oil instead of mining reserves, which was previously the case, starting Jan. 1, 2010 and applicable for 2009.

The U.S. Securities and Exchange Commission announced at the end of December 2008 that it was updating some of its rules to "help ensure more meaningful and comprehensive disclosure of information that, even though it does not appear on a company's balance sheet, is of significance to investors in making informed investment decisions."

The Canadian Association of Petroleum Producers (CAPP) has been asking for this for three years, and although ultimately it doesn't change much for producers, it does clarify things for investors and more closely aligns Canadian and U.S. rules in annual reports, said Greg Stringham, CAPP's vice-president of oil sands and markets.

Four oil sands mining companies are reducing until further notice their withdrawals of water from the Athabasca River, which is experiencing naturally occurring low flows.

The companies—**Canadian Natural Resources**, **Royal Dutch Shell**, **Suncor Energy**, and **Syncrude Canada**—were directed to do so by the Alberta government on Jan. 19.

Alberta Environment statistics show water flow levels have dropped into the yellow warning zone as determined by the Water Management Framework, introduced in 2007.

Connacher Oil and Gas is reinstating full steaming and attendant production ramp-up of its Great Divide Pod One steam assisted gravity drainage project.

The company said it expects to reach pre-curtailment bitumen production levels of approximately 9,000 barrels per day by the end of February, after previously cutting production due to market conditions.

Connacher has also publicly disclosed a proposed expansion to its in situ operations, with an eye to combined production of 44,000 barrels per day in 2012.

The Energy Resources Conservation Board (ERCB) has approved the **Sturgeon** upgrader, attaching 13 conditions to the planned facility, which was put on hold late last year by its proponents (Petro-Canada, UTS Energy, and Teck Cominco).

Nexen has announced first production of Premium Sweet Crude (PSC) from its upgrader at Long Lake, Alberta.

The upgrader is expected to ramp-up to full design rates of approximately 60,000 barrels per day of PSC over the next 12 to 18 months.

North Peace Energy has announced that steam injection has commenced on the L1 horizontal well at its Red Earth CSS pilot.

The steam injection phase is expected to last six to eight weeks after which the well will be put on production for six to nine months. After the production period, the steam injection will be repeated and followed by another production period. As well, following the steam injection of the L1 well, steam injection will commence on the L2 well followed by its production cycle.

Husky Energy says a small pilot proposed for McMullen may aid development of other thin bitumen reservoirs. The company is seeking Alberta Energy Resources Conservation Board and Alberta Environment approval for a steam assisted gravity drainage pilot to produce up to 755 barrels of bitumen per day.

The target bitumen reservoir is the Wabiskaw member of the Clearwater formation. The net pay thicknesses is about 10 to 16.5 metres. Pending regulatory approval, drilling and construction of well pads and surface facilities would start in June and will be completed by year's end. The pilot would run for three to five years.

An Alberta Cancer Board study of the cancer incidence in Fort Chipewyan, a small community on the Athabasca River downstream of Fort McMurray, has found that the rates for some cancers are higher than might be expected, although overall findings show no cause for alarm.

The overall findings, which are based on a small number of cases, show no cause for alarm, Dr. Tony Fields, vice-president, Cancer Corridor for Alberta Health Services, said Friday in a news conference to release the findings of the study. "They do, however, point to the need for some further investigation."

The Alberta and Canada governments have laid charges against Syncrude Canada for failing to have appropriate deterrents in place at a tailings pond at its Aurora North Site mine facility last spring.

The charges result from an incident on April 28, 2008, where approximately 500 migratory waterfowl died after landing on a tailings pond at the facility north of Fort McMurray.

The federal government's maximum penalty under the Migratory Bird Conservation Act is $300,000. The Alberta government's fine, under the Alberta Environmental Protection and Enhancement Act, is a maximum of $500,000. •

Project listing

Updated status of oil sands projects in Alberta

As of Mar. 13, 2009 with files from Strategy West.

TECHNOLOGY LEGEND

CSS	Cyclic steam stimulation
COGD	Combustion overhead garvity drainage
ET-DSP	Electro-thermal dynamic stripping process
N-SOLV	Heated solvent vapour extraction
SAGD	Steam assisted gravity drainage
THAI	Toe to heel air injection

COMPANY	CURRENT PROJECT	CAPACITY (bbl/d)	START-UP	REGULATORY STATUS	DEVELOPMENT PROGRESS	TECHNOLOGY
ATHABASCA REGION — IN SITU						
ALBERTA OILSANDS						
Clearwater	Pilot	2,000	2010/11	Announced	The company has completed its winter drilling program of eight wells, reports confirmation of high-quality bitumen thickness averaging 40 metres. Alberta Oilsands has also conducted cap rock integrity testing, and is proceeding with its application.	SAGD
	Commercial Project	10,000	2012	Announced	Application to be filed in 2009.	SAGD
ATHABASCA OIL SANDS						
Dover	Pilot	1,000-2,000	TBD	Applied	Regulatory application submitted Oct. 22, 2008.	SAGD
MacKay	Pilot	2,200	TBD	Applied	Regulatory application submitted Jun. 2, 2008.	SAGD
CANADIAN NATURAL RESOURCES						
Birch Mountain	Phase 1	60,000	TBD	Announced		TBA
Gregoire Lake	Phase 1	60,000	TBD	Announced		TBA
Grouse	Phase 1	60,000	TBD	Announced		TBA
Kirby	Phase 1	45,000	TBD	Applied	Final corporate sanction and project scope will be impacted by environmental regulations and their associated costs.	SAGD
Leismer	Phase 1	30,000	TBD	Announced		TBA
CHEVRON CANADA						
Ells River		100,000	2015	Announced	Chevron is looking at "a range of thermal and enhanced recovery technologies."	TBA
CONNACHER OIL AND GAS						
Great Divide	Pod 1	10,000	2007	Operating		SAGD
	Pod 2 (Algar)	10,000	2009	Approved	Construction temporarily suspended.	SAGD
	Expansion	24,000	2012	Disclosed	Public disclosure issued March 2009.	SAGD
CONOCOPHILLIPS CANADA						
Surmont	Phase 1	27,000	2008	Operating		SAGD
	Phase 2	83,000	2013	Approved	Engineering underway.	SAGD
DEVON CANADA						
Jackfish	Phase 1	35,000	2008	Operating	Sustained steam injection since August 2007. Production ramping up.	SAGD
	Phase 2	35,000	2011	Approved	Construction underway.	SAGD
ENCANA						
Borealis	Phase 1	35,000	TBD	Applied		SAGD
	Phase 2	32,500	TBD	Announced		SAGD
	Phase 3	32,500	TBD	Announced		SAGD
Christina Lake	Phase 1A	10,000	2002	Operating	Combined production from Christina Lake and Foster Creek is now about 63,000 barrels per day.	SAGD
	Phase 1B	8,800	2008	Operating	Construction complete. Steaming underway.	SAGD
	Phase 1C	40,000	2010	Under construction		SAGD
	Phase 1D	40,000	TBD	Approved		SAGD
	Unnamed Expansion 1	30,000	TBD	Announced		SAGD
	Unnamed Expansion 2	30,000	TBD	Announced		SAGD
	Unnamed Expansion 3	30,000	TBD	Announced		SAGD
	Unnamed Expansion 4	30,000	TBD	Announced		SAGD
	Unnamed Expansion 5	30,000	TBD	Announced		SAGD
Foster Creek	Phase 1A	24,000	2001	Operating		SAGD
	Debottlenecking	6,000	2003	Operating		SAGD
	Phase 1C — Stage 1	10,000	2005	Operating		SAGD
	Phase 1C — Stage 2	20,000	2007	Operating		SAGD

COMPANY	CURRENT PROJECT	CAPACITY (bbl/d)	START-UP	REGULATORY STATUS	DEVELOPMENT PROGRESS	TECHNOLOGY
Foster Creek *(cont'd)*	Phase 1D	30,000	2009	Under Construction		SAGD
	Phase 1E	30,000	2009	Under Construction		SAGD
	Phase 1F	30,000	TBD	Application		SAGD
ENERPLUS RESOURCES						
Kirby	Phase 1	10,000	TBD	Application		SAGD
	Phase 2	25,000	TBD	Announced		SAGD
E-T ENERGY						
Poplar Creek		1,000	2006	Approved	Expanded field test underway and planning for commercial implementation of ET-DSP (production using electrodes).	ET-DSP
EXCELSIOR ENERGY						
Hangingstone	Phase 1	10,000	2011	Announced	Excelsior says it will test a proprietary process called combustion overhead gravity drainage (COGD) on its leases.	COGD
GRIZZLY OIL SANDS						
Algar Lake		10,000	TBD	Announced		SAGD
HUSKY ENERGY						
McMullen	Pilot	775	TBD	Application		SAGD
Sunrise	Phase 1	50,000	TBD	Approved	Husky is "optimizing development planning." Final approvals expected in first half of 2010.	SAGD
	Phase 2	50,000	TBD	Approved		SAGD
	Phase 3	50,000	TBD	Approved		SAGD
	Phase 4	50,000	TBD	Approved		SAGD
IVANHOE ENERGY						
Tamarack	SAGD with HTL upgrading	20,000	2014	Announced	First commercial-scale project using HTL upgrading. Regulatory applications to be filed by mid-2010.	
JAPAN CANADA OIL SANDS						
Hangingstone	Pilot	10,000	2002	Operating		SAGD
	Phase 1	35,000	TBD	Disclosed		SAGD
KOREA NATIONAL OIL CORPORATION						
BlackGold	Phase 1	10,000	TBD	Application		SAGD
	Phase 2	20,000	TBD	Announced		SAGD
LARICINA ENERGY						
Germain	SAGD pilot	600	TBD	Application		SAGD
	Phase 1	10,000	TBD	Announced		SAGD
Saleski	Carbonate SAGD demonstration	1,200	TBD	Application		SAGD
	Phase 1	10,000	TBD	Announced		SAGD
MEG ENERGY						
Christina Lake	Phase 1	3,000	2008	Operating	Production commenced April 2008.	SAGD
	Phase 2	22,000	Q1 2009	Approved	Construction nearing completion.	SAGD
	Phase 2B	35,000	TBD	Application		SAGD
	Phase 3A	75,000	TBD	Announced	Application filed April 2008.	SAGD
	Phase 3B	75,000	TBD	Announced		SAGD
NEXEN						
Long Lake	Phase 1	72,000	2007	Operating	First production of synthetic crude achieved.	SAGD
	Phase 2	72,000	TBD	Announced	Sanctioning deferred until late 2009.	SAGD
	Phase 3	72,000	TBD	Announced		SAGD
	Phase 4		TBD	Announced		SAGD
Long Lake South	Phase 1	70,000	TBD	Approved		SAGD
	Phase 2	70,000	TBD	Approved		SAGD

COMPANY	CURRENT PROJECT	CAPACITY (bbl/d)	START-UP	REGULATORY STATUS	DEVELOPMENT PROGRESS	TECHNOLOGY
N-SOLV						
	Pilot plant	2,000	TBD	Announced	Enbridge and Hatch Energy are minority shareholders in the company.	N-SOLV
PATCH INTERNATIONAL						
Ells River		10,000	TBD	Announced	The company has indicated it is for sale.	SAGD
PETROBANK ENERGY AND RESOURCES						
Whitesands	Pilot	1,900	2006	Operating		THAI
	Expansion	1,900	2008	Approved		THAI
May River	Phase 1	10,000	TBD	Applied	Engineering firm Vista Projects has been awarded FEED services to Petrobank for the wellpad and pipeline package of May River.	THAI
	Subsequent Phases	90,000	TBD	Disclosed		
PETRO-CANADA						
Chard	Phase 1	40,000	TBD	Announced		SAGD
Lewis	Phase 1	40,000	TBD	Disclosed		SAGD
	Phase 2	40,000	TBD	Disclosed		SAGD
MacKay River	Phase 1	33,000	2002	Operating		SAGD
	Phase 2	40,000	2012	Approved	Regulatory approval granted in Q1 2008. Final investment decision expected in the first quarter of 2009. "Design refinement" continues.	SAGD
Meadow Creek	Phase 1	40,000	TBD	Approved		SAGD
	Phase 2	40,000	TBD	Approved		SAGD
SERRANO ENERGY						
Blackrod	Pilot	500	2009	Application	Serrano has closed its transfer of 15 per cent of its working interest in Blackrod to parent company Pearl Exploration. Ownership is now 20 per cent Serrano and 80 per cent Pearl.	SAGD
SOUTHERN PACIFIC RESOURCES						
STP McKay		10,000	TBD	Announced	Southern Pacific reports its winter program is on time and under budget, including stratigraphic hole drilling, water source well drilling, geotechnical analysis, cap rock integrity study, and environmental data collection.	SAGD
STATOILHYDRO CANADA						
Kai Kos Dehseh-Leismer	Demonstration	10,000	2009	Under construction		SAGD
Leismer	Commercial	20,000	TBD	Applied		SAGD
	Expansion	20,000	TBD	Applied		SAGD
Corner		40,000	TBD	Applied		SAGD
Thornbury		40,000	TBD	Applied		SAGD
Corner	Expansion	40,000	TBD	Applied		SAGD
Hangingstone		20,000	TBD	Applied		SAGD
Thornbury	Expansion	20,000	TBD	Applied		SAGD
Northwest Leismer		20,000	TBD	Applied		SAGD
South Leismer		20,000	TBD	Applied		SAGD
SUNCOR ENERGY						
Firebag	Phase 1	33,000	2004	Operating		SAGD
	Phase 2	35,000	2006	Operating		SAGD
	Cogeneration and Expansion	25,000	2007	Operating		SAGD
	Phase 3	52,500	TBD	Suspended	Construction being wound down into "safe mode," waiting out economy.	SAGD
	Phase 4	62,500	TBD	Application		SAGD
	Phase 5	62,500	TBD	Application		SAGD
	Phase 6	62,500	TBD	Application		SAGD
	Stages 3-6 Debottlenecking	23,500	TBD	Application		SAGD
SUNSHINE OIL SANDS						
West Ells	Phase 1	10,000	TBD	Announced		SAGD
	Phase 2	30,000	TBD	Announced		SAGD
	Phase 3	25,000	TBD	Announced		SAGD
Thickwood	Phase 1	10,000	TBD	Announced		SAGD
	Phase 2	30,000	TBD	Announced		SAGD
	Phase 3	25,000	TBD	Announced		SAGD

COMPANY	CURRENT PROJECT	CAPACITY (bbl/d)	START-UP	REGULATORY STATUS	DEVELOPMENT PROGRESS	TECHNOLOGY
TOTAL E&P CANADA						
Joslyn	Phase 1	2,000	2004	Operating		SAGD
	Phase 2	10,000	2006	Operating		SAGD
	Phase 3A	15,000	TBD	Withdrawn		SAGD
	Phase 3B	15,000	TBD	Disclosure		SAGD
VALUE CREATION GROUP						
Terre de Grace	Pilot	10,000	TBD	Application		SAGD
	Phase 1	40,000	TBD	Applied		SAGD
	Phase 2	40,000	TBD	Announced		SAGD
ATHABASCA REGION — MINING						
ATHABASCA OIL SANDS PROJECT						
Jackpine	Phase 1A	100,000	2010	Under construction		Mining
	Phase 1B	100,000	TBD	Approved		Mining
	Phase 2	100,000	TBD	Application		Mining
Muskeg River	Existing Facilities	155,000	2002	Operating		Mining
	Expansion and Debottlenecking	115,000	TBD	Approved	Final investment decision delayed.	Mining
Pierre River	Phase 1	100,000	TBD	Applied		Mining
	Phase 2	100,000	TBD	Applied		Mining
CANADIAN NATURAL RESOURCES						
Horizon	Phase 1	135,000	2008	Operating	First synthetic crude oil production achieved.	Mining
	Phases 2 and 3	135,000	TBD	Approved		Mining
	Phase 4	145,000	TBD	Announced		Mining
	Phase 5	162,000	TBD	Announced		Mining
IMPERIAL OIL						
Kearl	Phase 1	100,000	TBD	Approved	Imperial has awarded AMEC the contract for phase one engineering, procurement, and construction management. AMEC already undertook Kearl's FEED.	Mining
	Phase 2	100,000	TBD	Approved		Mining
	Phase 3	100,000	TBD	Approved		Mining
PETRO-CANADA						
Fort Hills	Phase 1	165,000	TBD	Approved	Final investment decision delayed. Expected now some time in 2009.	Mining
	Debottlenecking	25,000	TBD	Approved		Mining
SUNCOR ENERGY						
	Millennium	294,000	1967	Operating		Mining
	Steepbank Debottleneck Phase 3	4,000	2007	Operating		Mining
	Millennium Debottlenecking	23,000	2008	Operating		Mining
	North Steepbank Extension		2010	Under construction		Mining
Voyageur South	Phase 1	120,000	TBD	Applied		Mining
SYNCRUDE (MILDRED LAKE AND AURORA)						
	Stages 1 and 2	290,700	1978	Operating		Mining
	Stage 3 Expansion	116,300	2006	Operating		Mining
	Stage 3 Debottleneck	46,500	TBD	Announced		Mining
	Stage 4 Expansion	139,500	TBD	Announced		Mining
TOTAL E&P CANADA						
Joslyn	Phase 1 (North)	50,000	TBD	Applied		Mining
	Phase 2 (North)	50,000	TBD	Applied		Mining
	Phase 3 (South)	50,000	TBD	Announced		Mining
	Phase 4 (South)	50,000	TBD	Announced		Mining
Northern Lights	Phase 1	57,250	TBD	Application		Mining
	Phase 2	57,250	TBD	Application		Mining
UTS/TECK COMINCO						
Equinox (previously known as Lease 14)		50,000	TBD	Public disclosure	Regulatory application expected in mid-2009.	Mining
Frontier	Phase 1	100,000	TBD	Public disclosure	Regulatory application expected in mid-2010.	Mining
	Phase 2	60,000	TBD	Public disclosure		Mining

COMPANY	CURRENT PROJECT	CAPACITY (bbl/d)	START-UP	REGULATORY STATUS	DEVELOPMENT PROGRESS	TECHNOLOGY
COLD LAKE REGION – IN SITU						
BR OIL SANDS (SHELL)						
Orion	Phase 1	10,000	2008	Operating		SAGD
	Phase 2	10,000	TBD	Approved		SAGD
CANADIAN NATURAL RESOURCES						
	Wolf Lake	13,000	1985	Operating		CSS
	Wolf Lake SAGD	5,500	TBD	Application		SAGD
	Primrose South	45,000	1985	Operating		CSS
	Primrose North	30,000	2006	Operating		CSS
	Primrose East (Burnt Lake)	32,000	2009	Operating		CSS
	CSS Follow-up Process	25,000	TBD	Application		CSS
HUSKY ENERGY						
Caribou	Demonstration Project	10,000	TBD	Approved		SAGD
Tucker	Phase 1	30,000	2006	Operating	Additional drilling will most likely not continue until market conditions improve.	SAGD
IMPERIAL OIL						
	Phases 1-10: Leming, Maskwa, Mahihkan	110,000	1985	Operating		CSS
	Phases 11-13: Mahkeses	30,000	2003	Operating		CSS
	Phases 14-16: Nabiye, Mahihkan North	30,000	TBD	Approved		CSS
KOCH EXPLORATION CANADA						
Gemini	SAGD Project	10,000	TBD	Announced	Koch is in very early stages of development. Detailed engineering and environmental studies will be done, and Koch says community feedback will help determine the scope.	SAGD
OSUM OIL SANDS						
Taiga	SAGD Project	25,000-35,000	2014	Disclosed	Osum has issued its public disclosure document and started open houses.	SAGD
PENGROWTH ENERGY TRUST						
Lindbergh	SAGD Pilot	2,500	TBD	Application		SAGD
PEACE RIVER REGION – IN SITU						
ANDORA ENERGY (PAN ORIENT)						
Sawn Lake	SAGD Demonstration	1,400	TBD	Application	If the demonstration plant meets Andora's expectations, a full-scale development would follow.	SAGD
NORTH PEACE ENERGY						
Red Earth	CSS Pilot	1,001	2008	Operating	First steam achieved.	CSS
	Phase 1	10,000	2013	Announced		CSS
	Phase 2	10,000	TBD	Announced		CSS
	Phase 3	10,000	TBD	Announced		CSS
PENN WEST ENERGY TRUST						
Seal	CSS Pilot	75	TBD	Application		CSS
SHELL CANADA						
Carmon Creek	Cadotte Lake	12,501	1986	Operating		CSS
	Phase 1	37,500	TBD	Withdrawn	Shell has withdrawn its application, and is conducting an internal review of the project. Will submit a new application in 2009.	CSS
	Phase 2	50,000	TBD	Withdrawn		CSS
ATHABASCA REGION – UPGRADING						
CANADIAN NATURAL RESOURCES						
Horizon	Phase 1	135,000	2008	Operating	First production of synthetic crude oil achieved.	Upgrader
	Phases 2 and 3	135,000	TBD	Approved		Upgrader
	Phase 4	145,000	TBD	Announced		Upgrader
	Phase 5	162,000	TBD	Announced		Upgrader
NEXEN						
Long Lake	Phase 1	72,000	2008	Operating	First production of synthetic crude achieved. Nexen is now operator of the upgrader as well as the SAGD project.	Upgrader
	Phase 2	72,000	TBD	Approved	Sanction deferred until late 2009.	Upgrader
	Phase 3	72,000	TBD	Announced		Upgrader

COMPANY	CURRENT PROJECT	CAPACITY (bbl/d)	START-UP	REGULATORY STATUS	DEVELOPMENT PROGRESS	TECHNOLOGY
Long Lake *(cont'd)*	Phase 4	72,000	TBD	Announced		Upgrader
	Phase 5	72,000	TBD	Announced		Upgrader
	Phase 6	72,000	TBD	Announced		Upgrader
SUNCOR ENERGY						
	Base U1 and U2	281,000	1967	Operating		Upgrader
	Millennium Vacuum Unit	43,000	2005	Operating		Upgrader
	Millennium Coker Unit	116,000	2008	Operating		Upgrader
Voyageur	Phase 1	156,000	TBD	Approved	Voyageur construction being wound down to "safe mode," waiting out the economy.	Upgrader
	Phase 2	78,000	TBD	Approved		Upgrader
SYNCRUDE						
Mildred Lake	Stages 1 and 2	290,700	1978	Operating	Syncrude emissions reduction project continues.	Upgrader
	Stage 3 Expansion	116,300	2006	Operating		Upgrader
	Stage 3 Debottleneck	46,500	TBD	Announced	Detailed engineering underway.	Upgrader
	Stage 4 Expansion	139,500	TBD	Announced	Detailed engineering underway.	Upgrader
INDUSTRIAL HEARTLAND REGION – UPGRADING AND REFINING						
ATHABASCA OIL SANDS PROJECT						
Scotford Upgrader 1		155,000	2003	Operating		Upgrader
	Expansion	90,000	2010	Under construction		Upgrader
Scotford Upgrader 2	Phase 1	100,000	TBD	Applied		Upgrader
	Phase 2	100,000	TBD	Application		Upgrader
	Phase 3	100,000	TBD	Application		
	Phase 4	100,000	TBD	Application		
BA ENERGY						
Heartland Upgrader	Phase 1	54,400	TBD	Approved	BA Energy owner Value Creation has shelved the Heartland Upgrader and says it will be up to four years before it will revisit the project. BA Energy has been granted court protection from its creditors.	Upgrader
	Phase 2	54,400	TBD	Approved		Upgrader
	Phase 3	54,400	TBD	Approved		Upgrader
NORTH WEST UPGRADING						
Upgrader	Phase 1	50,000	TBD	Approved	Site preparation complete. Focus is on commercial agreements.	Upgrader
	Phase 2	50,000	TBD	Approved		Upgrader
	Phase 3	50,000	TBD	Approved		Upgrader
PETRO-CANADA						
Fort Hills Upgrader	Phase 1	165,000	TBD	Approved	Construction decision on Fort Hills upgrader has been deferred.	Upgrader
	Phases 2 and 3	175,000	TBD	Approved		Upgrader
Strathcona Refinery Conversion		135,000	2008	Approved	Construction complete. Ramp-up continues.	Upgrader
STATOILHYDRO CANADA						
StatoilHydro Upgrader	Phase 1	75,000	TBD	Withdrawn		Upgrader
	Phase 2	175,000	TBD	Withdrawn		Upgrader
TOTAL E&P CANADA						
Northern Lights Upgrader	Phase 1	56,600	TBD	Withdrawn	Total E&P now owns Syneco.	Upgrader
	Phase 2	56,600	TBD	Withdrawn		Upgrader
Total Upgrader	Phase 1	150,000	TBD	Application		Upgrader
	Phase 2	95,000	TBD	Application		Upgrader
	Debottlenecking	50,000	TBD	Application		
VALUE CREATION						
Terre de Grace Upgrader	Pilot	10,000	TBD	Application		Upgrader
	Phase 1	40,000	TBD	Announced		Upgrader
	Phase 2	40,000	TBD	Announced		Upgrader
PEACE RIVER REGION – UPGRADING						
PEACE RIVER OIL						
Bluesky Refining	Phase 1	50,000	TBD	Announced		Upgrader
	Phase 2	50,000	TBD	Announced		Upgrader
	Phase 3	50,000	TBD	Announced		Upgrader
	Phase 4	50,000	TBD	Announced		Upgrader

Glossary of oil sands terms

API

An American Petroleum Institute measure of liquid gravity. Water is 10 degrees API, and a typical light crude is from 35 to 40. Bitumen is 7.5 to 8.5.

Barrel

The traditional measurement for crude oil volumes. One barrel equals 42 US gallons (159 litres). There are 6.29 barrels in one cubic metre of oil.

Bitumen

Naturally occurring, viscous mixture of hydrocarbons that contains high levels of sulphur and nitrogen compounds. In its natural state, it is not recoverable at a commercial rate through a well because it is too thick to flow. Bitumen typically makes up about 10 per cent by weight of oilsand, but saturation varies.

Condensate

Mixture of extremely light hydrocarbons recoverable from gas reservoirs. Condensate is also referred to as a natural gas liquid, and is used as a diluent to reduce bitumen viscosity for pipeline transportation.

Cyclic steam stimulation

For several weeks, high-pressure steam is injected into the formation to soften the oilsand before being pumped to the surface for separation. The pressure created in the underground environment causes formation cracks that help move the bitumen to producing wells. After a portion of the reservoir has been saturated, the steam is turned off and the reservoir is allowed to soak for several weeks. Then the production phase brings the bitumen to the surface.

Density

The heaviness of crude oil, indicating the proportion of large, carbon-rich molecules, generally measured in kilograms per cubic metre (kg/m^3) or degrees on the American Petroleum Institute (API) gravity scale; in western Canada, oil up to 900 kg/m^3 is considered light to medium crude—oil above this density is deemed as heavy oil or bitumen.

Diluent

see Condensate

Established recoverable reserves

Reserves recoverable under current technology and present and anticipated economic conditions, plus that portion of recoverable reserves that is interpreted to exist, based on geological, geophysical, or similar information, with reasonable certainty.

Established reserves

Reserves recoverable with current technology and present and anticipated economic conditions specifically proved by drilling, testing, or production, plus the portion of contiguous recoverable reserves that are interpreted to exist from geological, geophysical, or similar information with reasonable certainty.

Extraction

A process, unique to the oil sands industry, which separates the bitumen from the oilsand using hot water, steam, and caustic soda.

Froth treatment

The means to recover bitumen from the mixture of water, bitumen, and solids "froth" produced in hot water extraction (in mining-based recovery).

Gasification

A process to partially oxidize any hydrocarbon, typically heavy residues, to a mixture of hydrogen and carbon monoxide. Can be used to produce hydrogen and various energy byproducts.

Greenhouse gases

Gases commonly believed to be connected to climate change and global warming. CO_2 is the most common, but greenhouse gases also include other light hydrocarbons (such as methane) and nitrous oxide.

Initial established reserves

Established reserves prior to the deduction of any production.

Initial volume in place

The volume calculated or interpreted to exist in a reservoir before any volume has been produced.

In situ

Latin for "in place." In situ recovery refers to various methods used to recover deeply buried bitumen deposits.

In situ combustion

A displacement enhanced oil recovery method. It works by generating combustion gases (primarily CO and CO_2) downhole, which then "pushes" the oil towards the recovery well.

Lease

A legal document from the province of Alberta giving an operator the right to extract bitumen from the oilsand existing within the specified lease area. The land must be reclaimed and returned to the Crown at the end of operations.

Muskeg

A water-soaked layer of decaying plant material, one to three metres thick, found on top of the overburden.

Oil Sands

Bitumen-soaked sand, located in four geographic regions of Alberta: Athabasca, Wabasca, Cold Lake, and Peace River. The Athabasca deposit is the largest, encompassing more than 42,340 square kilometres. Total deposits of bitumen in Alberta are estimated at 1.7 to 2.5 trillion barrels.

Overburden

A layer of sand, gravel, and shale between the surface and the underlying oilsand. Must be removed before oil sands can be mined. Overburden underlies muskeg in many places.

Pilot plant

Small model plant for testing processes under actual production conditions.

Proven recoverable reserves

Reserves that have been proven through production or testing to be recoverable with existing technology and under present economic conditions.

Reclamation

Returning disturbed land to a stable, biologically productive state. Reclaimed property is returned to the province of Alberta at the end of operations.

Remaining established reserves

Initial reserves less cumulative production.

Royalty

The Crown's share of production or revenue. About three quarters of Canadian crude oil is produced from lands, including the oil sands, on which the Crown holds mineral rights. The lease or permit between the developer and the Crown sets out the arrangements for sharing the risks and rewards.

Steam assisted gravity drainage (SAGD)

An in situ production process using two closely spaced horizontal wells: one for steam injection and the other for production of the bitumen/water emulsion.

Synthetic crude oil

A manufactured crude oil comprised of naptha, distillate, and gas oil-boiling range material. Can range from high-quality, light sweet bottomless crude to heavy, sour blends.

Tailings

A combination of water, sand, silt, and fine clay particles that is a byproduct of removing the bitumen from the oilsand.

Tailings settling basin

The primary purpose of the tailings settling basin is to serve as a process vessel allowing time for tailings water to clarify and silt and clay particles to settle, so the water can be reused in extraction. The settling basin also acts as a thickener, preparing mature fine tails for final reclamation.

Thermal recovery

Any process by which heat energy is used to reduce the viscosity of bitumen in situ to facilitate recovery.

Toe-to-heel air injection (THAI)

An in situ combustion method for producing heavy oil and oilsand. In this technique, combustion starts from a vertical well, while the oil is produced from a horizontal well having its toe in close proximity to the vertical air-injection well. This production method is a modification of conventional fire flooding techniques in which the flame front from a vertical well pushes the oil to be produced from another vertical well.

Truck-and-shovel mining

Large electric or hydraulic shovels are used to remove the oilsand and load very large trucks. The trucks haul the oilsand to dump pockets where it is conveyed or pipelined to the extraction plant. Trucks and shovels are more economic to operate than the bucket-wheel reclaimers and draglines they have replaced at oil sands mines.

Upgrading

The process of converting heavy oil or bitumen into synthetic crude either through the removal of carbon (coking) or the addition of hydrogen (hydroconversion).

Vapour extraction (VAPEX)

VAPEX is a non-thermal recovery method that involves injecting a gaseous hydrocarbon solvent into the reservoir where it dissolves into the sludge-like oil, which becomes less viscous (or more fluid) before draining into a lower horizontal well and being extracted.

Viscosity

The ability of a liquid to flow. The lower the viscosity, the more easily the liquid will flow.

CONTACTS

The latest on oil sands projects in Alberta

Oil Sands Producers

Alberta Oilsands	www.aboilsands.ca
Albian Sands Energy	www.albiansands.ca
Andora Energy	www.andoraenergy.com
Athabasca Oil Sands	www.aosc.com
Baytex Energy	www.baytex.ab.ca
Canadian Natural Resources	www.cnrl.com
Chevron Canada	www.chevron.ca
Connacher Oil and Gas	www.connacheroil.com
ConocoPhillips Canada	www.conocophillips.ca
Devon Canada	www.dvn.com
EnCana	www.encana.com
Enerplus Resources Fund	www.enerplus.com
E-T Energy	www.e-tenergy.com
Excelsior Energy	www.excelsiorenergy.com
Husky Energy	www.huskyenergy.ca
Imperial Oil	www.imperialoil.ca
Ivanhoe Energy	www.ivanhoe-energy.com
Japan Canada Oil Sands	www.jacos.com
Korea National Oil Corporation	www.knoc.co.kr
Laricina Energy	www.laricinaenergy.com
Marathon Oil	www.marathon.com
MEG Energy	www.megenergy.com
Nexen	www.nexeninc.com
North Peace Energy	www.northpec.com
North West Upgrading	www.northwestupgrading.com
N-Solv	www.n-solv.com
Occidental Petroleum Corporation	www.oxy.com
Oilsands Quest	www.oilsandsquest.com
Opti Canada	www.opticanada.com
OSUM Oil Sands	www.osumcorp.com
Patch International	www.patchenergy.com
Pan Orient Energy	www.panorient.ca
Pengrowth Energy Trust	www.pengrowth.com
Petro-Canada	www.petro-canada.com
Petrobank Energy and Resources	www.petrobank.com
Shell Canada	www.shell.ca
Southern Pacific Resource	www.shpacific.com
StatoilHydro Canada	www.statoilhydro.com
Suncor Energy	www.suncor.com
Sunshine Oilsands	www.sunshineoilsands.com
Syncrude	www.syncrude.ca
Talisman Energy	www.talisman-energy.com
Teck Cominco	www.teckcominco.com
Total E&P Canada	www.total-ep-canada.com
UTS Energy	www.uts.ca
Value Creation Group	www.vctek.com

Associations/Organizations

Alberta Building Trades Council	www.albertabuildingtrades.com
Alberta Chamber of Resources	www.acr-alberta.com
Alberta Chambers of Commerce	www.abchamber.ca
Alberta Energy	www.energy.gov.ab.ca
Alberta Energy Research Institute	www.aeri.ab.ca
Alberta Environment	www.environment.alberta.ca
Alberta Research Council	www.arc.ab.ca
Alberta's Industrial Heartland Association	www.industrialheartland.com
Canadian Association of Geophysical Contractors	www.cagc.ca
Canadian Association of Petroleum Producers	www.capp.ca
Canadian Heavy Oil Assocation	www.choa.ab.ca
Canadian Oil Sands Network for Research and Development	www.conrad.ab.ca
Energy Resources Conservation Board	www.ercb.ca
Lakeland Industry and Community Association	www.lica.ca
Natural Resources Conservation Board	www.nrcb.gov.ab.ca
Oil Sands Developers Group	www.oilsandsdevelopers.ca
Petroleum Technology Alliance Canada	www.ptac.org

For more information, visit us at

www.albertacanada.com

Published by

junewarren-nickle's energy group

junewarren-nickles.com