ALBERTA OIL SANDS INDUSTRY

QUARTERLY UPDATE

SUMMER 2013

Reporting on the period: Mar. 15, 2013, to Jun. 17, 2013

Alberta Government

All about the oil sands

Background of an important global resource

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Canada has the third-largest oil reserves in the world, after Saudi Arabia and Venezuela. Of Canada's 173 billion barrels of oil reserves, 170 billion barrels are located in Alberta, and about 168 billion barrels are recoverable from bitumen. This is a resource that has been developed for decades but is now gaining increased global attention as conventional supplies—so-called "easy" oil—continue to be depleted. The figure of 168 billion barrels of bitumen represents what is considered economically recoverable with today's technology, but with new technologies, this reserve estimate could be significantly increased. In fact, total oil sands reserves in place are estimated at 1.8 trillion barrels.

There are three major bitumen (or oil sands) deposits in Alberta. The largest is the Athabasca deposit, which is located in the province's northeast in the Regional Municipality of Wood Buffalo. The main population centre of the Athabasca deposit is 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.

For the first time in 2012, in situ oil sands production exceeded mined oil sands production in Alberta. In 2012, 52 per cent of the province's oil sands volumes were produced using in situ methods. Alberta will continue to rely to a greater extent on in situ production in the future, as 80 per cent of the province's proven bitumen reserves are too deep underground to recover using mining methods.

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 the melted bitumen flows into the lower well via gravity and is pumped to the surface using artificial lift.

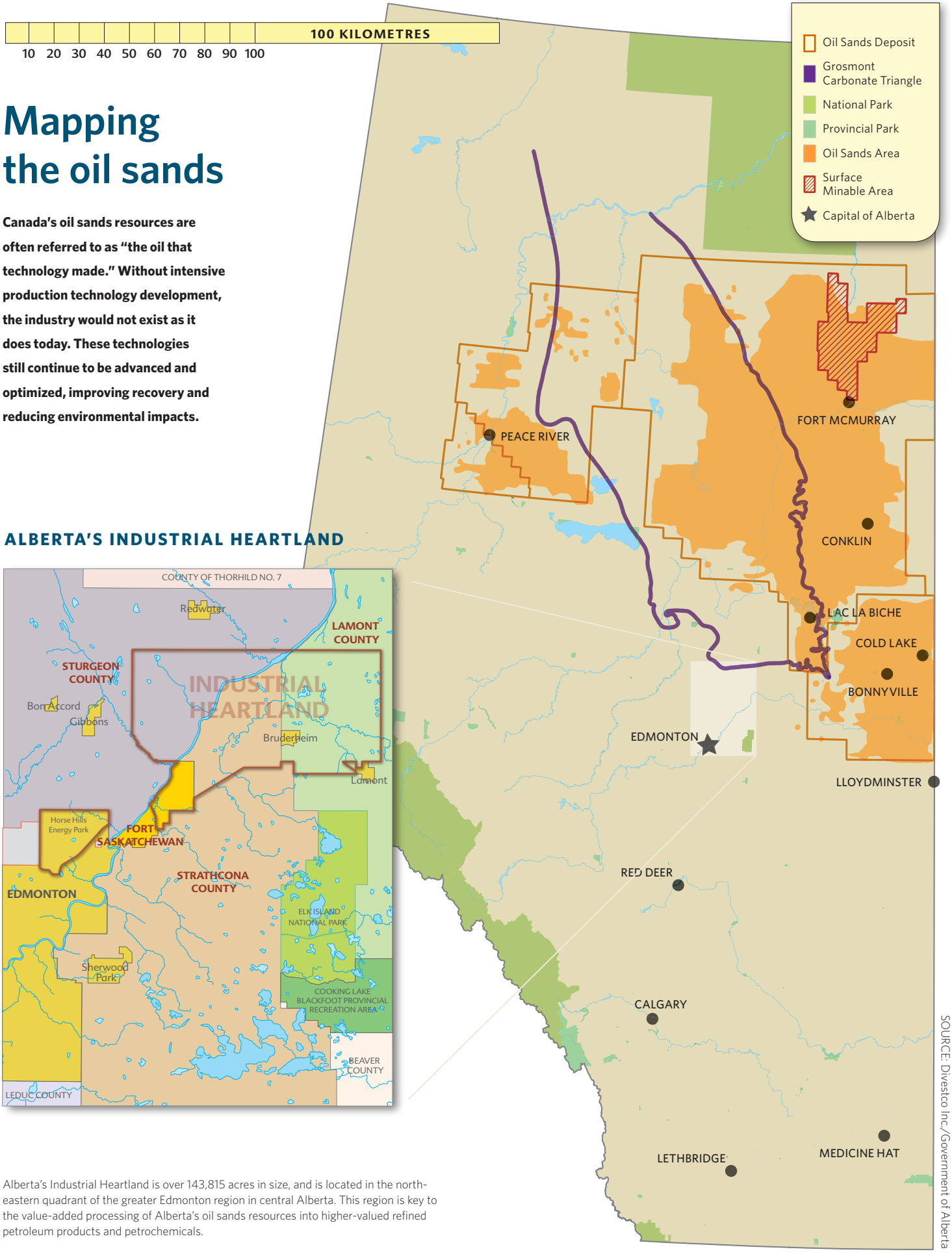
Both SAGD and CSS are used in the Cold Lake and Peace River deposits, while SAGD is the in situ technology of choice in the Athabasca deposit. The selection is based on a number of factors, including geology. The technologies combined currently produce just over one million barrels per day.

Research is underway on a number of other production technologies designed to optimize production, including variations on solvent-assisted SAGD and CSS, recovery using electricity, and in situ combustion.

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, which is a refinery feedstock. That can be transformed into transportation fuels and other products. ■

Mapping the oil sands

Canada's 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 143,815 acres in size, and is located in the north-eastern quadrant of the greater Edmonton region in central Alberta. This region is key to the value-added processing of Alberta's oil sands resources into higher-valued refined petroleum products and petrochemicals.

SOURCE: Divestco Inc./Government of Alberta

GOVERNMENT UPDATE

ERCB REPORT INDICATES LARGEST CONVENTIONAL CRUDE OIL PRODUCTION AND RESERVES INCREASE IN DECADES

The latest edition of the Energy Resources Conservation Board (ERCB) publication *ST98-2013 Alberta's Energy Reserves 2012 and Supply/Demand Outlook 2013-2022* shows a 14 per cent increase in production and 9.5 per cent increase in reserves over 2011 levels.

In 2012, Alberta's crude oil production totalled 88.4 thousand cubic metres (556,000 barrels) of oil per day with a yearly total of 32.3 million cubic metres (204 million barrels). This increase is due to the higher production rates of horizontal wells.

In 2012, Alberta produced 305 thousand cubic metres (1.9 million barrels) per day of raw crude bitumen from the oil sands for a yearly total of 112 million cubic metres (704 million barrels). This represents a 10 per cent increase over Alberta's 2011 crude bitumen production.

The ERCB forecasts Alberta's annual raw crude bitumen production will total 605,400 cubic metres (3.8 million barrels) per day for a total of 221 million cubic metres (1.39 billion barrels) per year in 2022.

The report notes that, since 1967, Alberta has produced about 1.4 billion cubic metres (8.8 billion barrels) of raw crude bitumen from the oil sands, and about 2.7 billion cubic metres (16.7 billion barrels) of crude oil since 1914.

Other report highlights include:

- Alberta's total remaining established crude bitumen and crude oil reserves totalled 27 billion cubic metres (169.6 billion barrels), consisting of 26.7 billion cubic metres (167.9 billion barrels) of crude bitumen and 269.2 million cubic metres (1.7 billion barrels) of crude oil.
- Remaining established marketable conventional gas reserves stood at 916 billion cubic metres (33 trillion cubic feet), a decrease of three per cent from 2011.
- Remaining established reserves of natural gas liquids stood at 252 million cubic metres (1.6 billion barrels), down one per cent from 2011.

FIVE INNOVATIVE ENERGY PILOT PROJECTS TO LAUNCH

Reducing freshwater use and enhancing oil recovery in oil sands development are among five new pilot projects supported by the Innovative Energy Technologies Program (IETP).

Alberta's oil sands holds 1.8 trillion barrels of bitumen. Only about nine per cent, or 169 billion barrels, are recoverable using existing technologies. Three of the recently funded IETP projects have the potential to dramatically reduce the amount of fresh water used during production. Another project will use a new method of steam production for more efficient extraction, reducing greenhouse gas emissions. The remaining project will focus on improving the recovery of crude oil and bitumen in reserves that were once unrecoverable.

The successful projects were submitted by Canadian Natural Resources Limited, Cenovus Energy Inc., Imperial Oil Limited and Perpetual Energy Inc.

Since 2004, the IETP has supported 26 projects. This round of the program is providing $33 million in royalty allowances for the approved projects, with industry contributing an estimated $173 million.

THE GOVERNMENTS OF CANADA AND OF ALBERTA LAUNCH NEW ONLINE PORTAL FOR ACCESSING OIL SANDS ENVIRONMENTAL MONITORING DATA AND INFORMATION

Access to federal and provincial environmental monitoring data on air, water, land and biodiversity in the oil sands is now available through an online data portal at jointoilsandsmonitoring.ca.

The new portal represents the next stage of progress for the *Joint Canada-Alberta Implementation Plan for Oil Sands Monitoring*, announced in February 2012.

The joint plan represents a scientific undertaking that is unprecedented in Canada. It will monitor the impacts of oil sands activity over an area covering some 140,000 square kilometres.

The information and data portal offers visitors an overview of the monitoring process along with a map

identifying specific water, air, land and biodiversity monitoring sites, and allows users to see what is being monitored and the data that has been gathered for each site. As new data is collected, analyzed and validated, it will be posted and publicly accessible.

The information and data found on the joint portal will complement what can be found on Alberta's Oil Sands Information Portal at osip.alberta.ca. Together, the two portals ensure all available data pertaining to environmental monitoring in the oil sands region is publicly accessible.

The joint plan is being phased in over three years, with work having begun in 2012. The scope and volume of data on the portal will increase as the joint plan is fully implemented.

The Alberta Energy Regulator will be responsible for regulating the life cycle of an energy project, from application and construction to production abandonment and reclamation.

CHIEF EXECUTIVE OFFICER OF NEW ENERGY REGULATOR NAMED

Chief executive officer Jim Ellis will be responsible for the operations of the new Alberta Energy Regulator, joining recently named board chair Gerry Protti on the leadership team.

As chair of the board of directors, Protti will be responsible for setting the general direction of the regulator's business and affairs. As chief executive officer, Ellis will handle the day-to-day operations of the province-wide regulator with nearly 1,000 staff and a $200-million budget.

Ellis has served as deputy minister of the provincial energy and environment departments, and has led work on regional land planning, cumulative effects management, regulatory enhancement and responsible development policy. Most recently, he was the lead Alberta official on the Canadian Energy Strategy.

The Alberta Energy Regulator will be responsible for regulating the province's upstream oil, oil sands, natural gas and coal development. With a mandate to provide for the efficient, safe, orderly and environmentally responsible development of energy resources, the Alberta Energy Regulator will be responsible for regulating the life cycle of an energy project, from application and construction to production abandonment and reclamation. It officially launched on June 17 and will phase in operations over the next 12 months.

MINISTER MCQUEEN STATEMENT ON NORTHERN GATEWAY PIPELINE

Environment and Sustainable Resource Development Minister Diana McQueen issued the following statement on British Columbia's recent response to the Northern Gateway pipeline proposal.

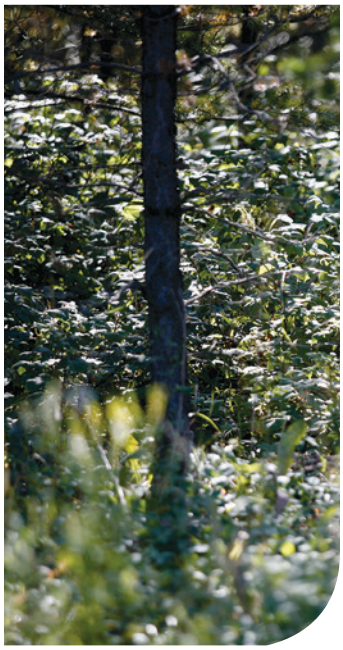
"Alberta respects the hearing process underway for the Northern Gateway pipeline, and we trust that the panel will make its decisions based on science and all the evidence that has been presented.

"Alberta also respects that the government of British Columbia has concerns about the pipeline that need to be addressed, and an appropriate forum in which to do that.

"I understand from B.C.'s announcement that the government is not comfortable supporting the project as proposed without more assurance that environmental protection and public safety are adequately addressed. B.C., like Alberta, wants to ensure that our energy development is responsible and safe.

"This is an ongoing, federally regulated review and I expect that the concerns brought forward by the government of British Columbia will be discussed and addressed through that forum.

"British Columbia and Alberta have implemented strong environmental standards to protect and enhance our environment. Our two provinces also have a shared commitment to economic growth and job creation. We believe we can continue to work together on both the environment and the economy, and this was the message I discussed earlier this week during my productive meeting with B.C. Environment Minister [now Health Minister] Terry Lake." ■



What's new in the oil sands

BUSINESS

Rail transport could more than meet the growing demand from oil sands producers for market access even in the absence of the proposed Keystone XL Pipeline, says a U.S. Department of State report.

By late 2014, there will be enough insulated railcars to transport about 800,000 barrels per day of bitumen with little or no diluent, equivalent to just over one million barrels per day of dilbit, according to a market analysis included in the Draft Supplemental Environmental Impact Statement for Keystone XL. That's more than the initial 830,000 barrels per day of dilbit that would be transported on the proposed pipeline.

The Canadian National Railway Company and Canadian Pacific currently are moving approximately 200,000 barrels of crude per day, including 120,000 from the Western Canadian Sedimentary Basin, the report suggests.

Dilbit and synbit are no more corrosive in a crude oil transmission pipeline than comparable heavy sour crudes and in many cases may be less corrosive, a report by a United Kingdom consultant has concluded.

"Consequently, there are no significant additional implications for corrosion control in a pipeline carrying dilbit and synbit as part of pipeline integrity management over and above what is already standard practice," says Penspen Integrity, a division of Penspen Limited.

The Canadian Energy Pipeline Association commissioned the $50,000 report to "put to bed" claims from environmental groups that diluted bitumen presents an increased risk to transmission pipelines because it is more corrosive than conventional crude oil, says Brenda Kenny, association president and chief executive officer. "We sincerely hope that this will provide Canadians with comfort and confidence on this issue."

KBR, Inc. has signed a three-year agreement with Suncor Energy Inc. to provide turnaround services at the company's refinery near Edmonton. KBR will also be handling off-site modularization and pipe fabrication for Shell Canada Limited's Quest carbon capture and storage project. The Quest project is designed to capture more than one million tonnes of CO_2 from Shell's Scotford upgrader near Edmonton.

Direct operational staff such as power engineers, heavy equipment operators and petroleum engineers will make up a large part of the demand for the 22,200 skilled workers required by the oil sands industry in the next 10 years, says the Petroleum Human Resources Council of Canada.

Power engineers will have the highest demand over the next decade and make up about 25 per cent of projected hiring requirements for both in situ and upgrading operations, says the council's latest study, *The Decade Ahead: Oil Sands Labour Demand Outlook to 2022*.

"The skills shortage even extends to external industries the oil sands operations sector relies on, like support services, manufacturing and construction," the council says.

Sunshine Oilsands Ltd. says its West Ells steam assisted gravity drainage project, currently under construction near Fort McMurray, will experience higher costs and minor delays.

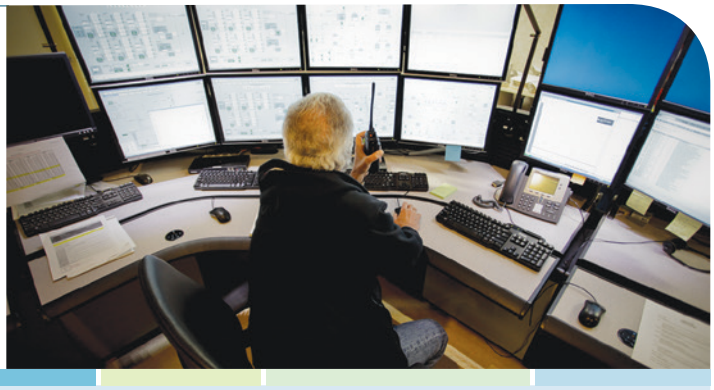
Total (Phase 1 and 2) direct costs at West Ells are now estimated at approximately $496 million, excluding the road and further contingencies—a $28-million increase from an earlier installed cost estimate of approximately $468 million. The anticipated date for first steam injection also has been delayed to late in the third quarter or early in the fourth quarter of 2013, from the third quarter as earlier scheduled.

TransCanada Corporation is proceeding with its proposed $900-million Heartland Pipeline and TC Terminals projects in central Alberta. The 200-kilometre pipeline will connect the Edmonton area to facilities at Hardisty, Alta., and could carry 900,000 barrels per day of crude oil. The terminal will provide storage capacity for up to 1.9 million barrels of crude in the Industrial Heartland region north of Edmonton.

The company will file its regulatory application for the terminal in spring 2013, with the pipeline application following in the fall. Both projects are expected to begin operations in the second half of 2015. ■

What's new in the oil sands

TECHNOLOGY



Newalta Corp. has signed a contract with Shell Canada Limited to process mature fine tailings (MFT) at the company's Jackpine Mine near Fort McMurray, Alta. This represents Newalta's second long-term contract to process MFT using centrifugation technology.

Newalta expects to start operations in October 2013. The company will employ 20 people and operate two large-bowl centrifuges on the site.

The Sturgeon refinery, owned by the North West Redwater Partnership and currently under construction near Edmonton, has inked a $14-million deal with General Electric (GE)'s Power Conversion business. GE will be supply its Series 9000-RCM large electric motors to power the refinery's reciprocating compressors, and will also provide related support services.

The 22,000-horsepower motors are designed for quick installation and start-up, GE says.

Kentz Corporation Limited will be the main telecommunications contractor for the Fort Hills oilsands mining project. The contract includes engineering and procurement services for both temporary and permanent information technology structures. The multi-year contract will be handled out of Kentz's Calgary engineering centre.

"Since entering the Canadian market in 2008, we have built a strong technical support services [TSS] business in the region, and are currently providing a range of TSS services to many of the projects in the oilsands region, including the Kearl oilsands project," says Mike Murphy, chief operating officer, technical support services for Kentz. The Fort Hills project is owned by Total E&P Canada Ltd., Teck Resources Limited and Suncor Energy Inc., which is also the operator.

Devon Energy Corporation is testing a variety of productivity enhancements at its Jackfish 1 thermal oil project, including the use of solvents and natural gas co-injection.

"Our first pilot program on these new fronts kicked off in the first quarter. If successful, these technologies will likely apply to our other thermal assets," says David Hager, chief operating officer.

"We will be monitoring the results of this pilot program over the course of the year to determine the degree of success and the optimal path forward regarding their use at other locations."

Hager also notes that the company expects payout at Jackfish 1 to be achieved later this year.

ATCO Energy Solutions has agreed to provide essential water transportation services to North West Redwater Partnership's Sturgeon County, Alta., refinery.

Work has already begun on expanding the Industrial Heartland's infrastructure in anticipation of the new refinery. In 2011-12, ATCO conducted sensitive water infrastructure upgrades, as well as improvements to the existing river intake on the North Saskatchewan River.

ATCO will also build a new pump house and a water pipeline under the river by 2014. The upgrades are intended to provide a secure supply of water for the refinery, but will likely also benefit other customers in the industrial region, the company says.

Praxair Canada Inc. will build, own and operate an air separation facility at North West Redwater Partnership's Sturgeon refinery.

The plant will produce 2,000 tonnes of oxygen per day, as well as associated amounts of nitrogen and argon. As part of North West's gasification process, oxygen is needed to produce the hydrogen that will be used to upgrade bitumen into diesel and other products.

The plant is scheduled to begin operations in 2016. It will be Praxair's third air separation facility in Alberta.

Excess gas from Baytex Energy Corp.'s heavy oil operations near Peace River, Alta., will be used for power generation, as part of a 10-year deal with Genalta Power Inc.

Baytex will build a pipeline to connect its existing integrated gas collection system in the Harmon Valley and West Harmon areas to a power generating facility currently under construction by Genalta. Construction of the pipeline should finish in the first half of 2013.

"Baytex has been working to reduce emissions in the region, and this initiative is part of our ongoing commitment to conduct our operations in an environmentally responsible manner," says James Bowzer, president and chief executive officer of the company. ■

OIL SANDS PROJECT TECHNOLOGY GUIDE

CSS—CYCLIC STEAM STIMULATION

CSS involves injecting high-pressure steam into the reservoir for several weeks, followed by several weeks where the reservoir is left to "soak." The heat softens the bitumen and the water dilutes and separates the bitumen from the sand. The pressure creates cracks and openings through which the bitumen can flow back into the steam injector wells, which are converted to production mode.

ET-DSP—ELECTRO-THERMAL DYNAMIC STRIPPING

ET-DSP combines the majority of the dominant heat transfer mechanisms to heat and mobilize bitumen in situ. Electrodes are placed in a grid configuration and a production well is located within the centre of each series of electrode wells. The technology has been commercially applied for soil remediation and is expected to reduce greenhouse gas emissions and water use.

N-SOLV

N-Solv involves the injection of pure, heated solvent vapour into an oil sands reservoir where it condenses, delivering heat to the reservoir and subsequently dissolving the bitumen, with the resulting miscible liquids flowing by gravity to a production well. It is designed to accelerate extraction rates and reduce greenhouse gas emissions.

PRIMARY PRODUCTION—COLD HEAVY OIL PRODUCTION WITH SAND

Cold heavy oil production with sand (CHOPS) is a non-thermal in situ primary production technology that involves the continuous production of sand using progressing cavity pumps to enhance recovery.

SAGD—STEAM ASSISTED GRAVITY DRAINAGE

SAGD employs two parallel horizontal wells: one injection well near the top of the reservoir, through which high-pressure steam is continuously injected, and one production well near the bottom of the reservoir into which the softened bitumen continuously flows and can be pumped to the surface. SAGD surface facilities include steam generation, water processing and bitumen treatment. Multiple operators are also now working with solvent co-injection in SAGD to increase recovery and reduce natural gas and water requirements.

SURFACE MINING

Integrated oil sands mining operations accomplish three main functions: mining the oil sands, separating the bitumen from the sand and upgrading the bitumen so refiners can work with it.

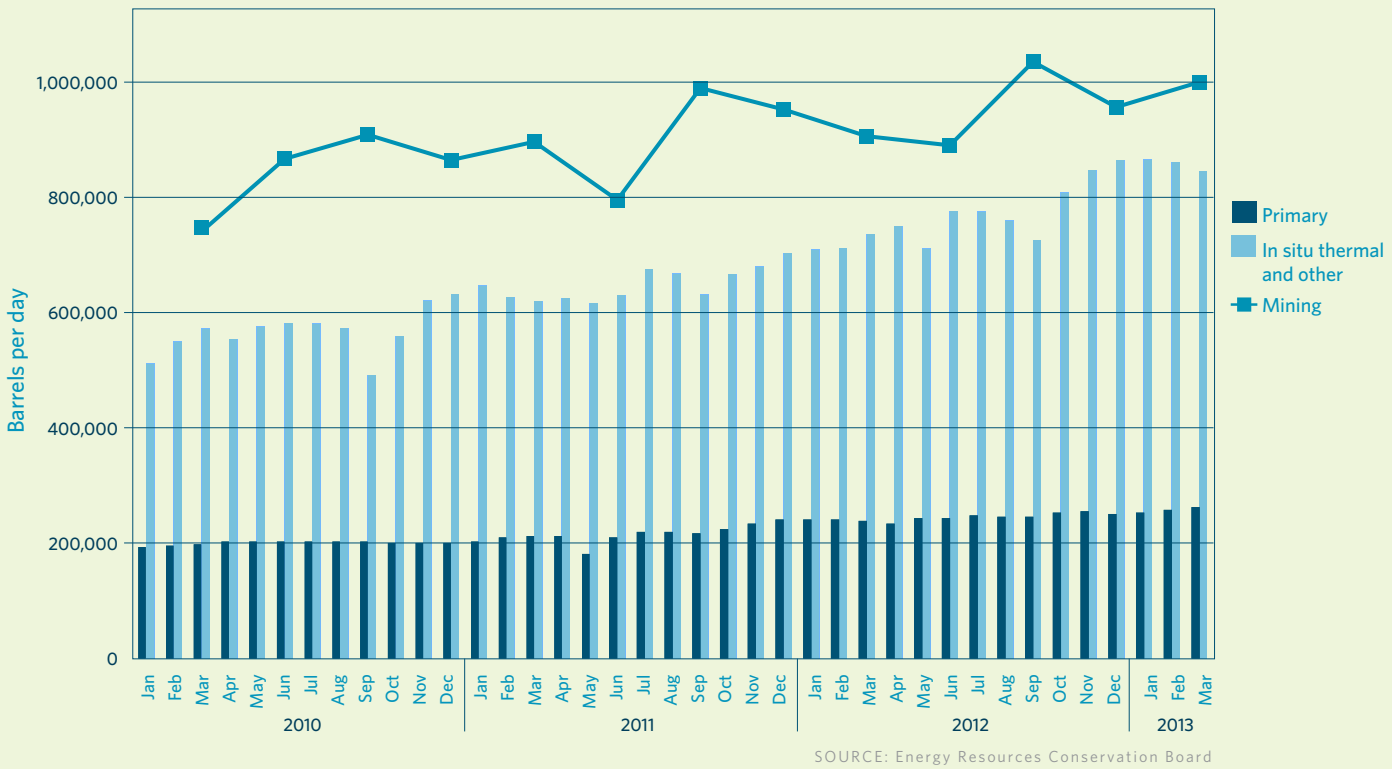
TAGD—THERMAL ASSISTED GRAVITY DRAINAGE

TAGD is a process being developed for the in situ recovery of bitumen from carbonate formations. TAGD uses an array of downhole heaters installed in horizontal wells to heat the reservoir via thermal conduction.

THAI—TOE TO HEEL AIR INJECTION

THAI uses a vertical air injection well with a horizontal production well. Rather than steam, THAI technology injects air and then relies on underground combustion of a portion of the oil in the ground to generate the heat required to melt the remainder of the bitumen and allow it to flow into the production well. The process is intended to reduce greenhouse gas emissions and water use.

Alberta Oil Sands Production by Extraction Method



SOURCE: Energy Resources Conservation Board

Project listings

Updated status of oil sands projects in Alberta

As of June 2013

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS
NORTH ATHABASCA REGION — MINING			
CANADIAN NATURAL RESOURCES LIMITED			
Horizon			
Canadian Natural says during the first quarter the Horizon project achieved strong, reliable production volumes, reflecting a steady, sustained increase in reliablity over the last year as the company focuses on enhanced maintenance strategy and operational discipline. Overall, the Phase 2/3 expansion is 20 per cent complete.			
Phase 1	135,000	2008	Operating
Tranche 2	5,000	2012	Operating
Phase 2A	10,000	2015	Construction
Phase 2B	45,000	2016	Construction
Phase 3	80,000	2017	Construction
IMPERIAL OIL LIMITED			
Kearl			
Imperial Oil announced the start-up of one of three froth-treatment trains at Kearl on April 27. Start-up of the remaining two will happen sequentially as planned, bringing production to capacity of 110,000 barrels per day later in 2013. The Kearl expansion project is approximately 32 per cent complete.			
Phase 1	110,000	2013	Operating
Phase 2	110,000	2015	Construction
Phase 3 Debottleneck	70,000	2020	Approved
SHELL ALBIAN SANDS			
Jackpine			
A decision from the federal joint review panel on the Jackpine expansion project is expected in 2013.			
Phase 1A	100,000	2010	Operating
Phase 1B	100,000	TBD	Approved
Expansion	100,000	2017	Application
Muskeg River			
Minority partner Marathon Oil Corporation is reporting improved reliability at the Athabasca Oil Sands Project. The company has announced it is no longer seeking to sell its stake in the project.			
Commercial	155,000	2002	Operating
Expansion & Debottlenecking	115,000	TBD	Approved
Pierre River			
A joint review panel of the Canadian Environmental Assessment Agency and Energy Resources Conservation Board is expected to submit its report on the Pierre River project by the end of 2013.			
Phase 1	100,000	2018	Application
Phase 2	100,000	TBD	Application
SUNCOR ENERGY INC.			
Base Operations			
Suncor says that during the first quarter of 2013, oilsands production numbers increased by approximately 50,000 barrels per day compared to the corresponding period of 2012, thanks in part to stronger upgrader reliability.			
Millennium Mine	294,000	1967	Operating
Steepbank Debottleneck Phase 3	4,000	2007	Operating
Millennium Debottlenecking	23,000	2008	Operating
North Steepbank Extension	180,000	2012	Operating
Fort Hills			
A sanction decision on Fort Hills is expected in the second half of 2013.			
Phase 1	165,000	2017	Approved
Debottleneck	25,000	TBD	Approved
Voyageur South			
Suncor considers Voyageur South to be a "longer-term" project and has not confirmed a start-up date.			
Phase 1	120,000	TBD	
SYNCRUDE CANADA LTD.			
Mildred Lake/Aurora			
Canadian Oil Sands Limited says Syncrude experienced several unplanned outages during the first quarter of 2013, but progress has been made in the operations area, with the facility experiencing optimal 36-month run lengths for two of its three cokers.			
Base Mine Stage 1 & 2 Expansion	290,700	1978	Operating
Stage 3 Expansion	116,300	2006	Operating
Aurora South Train 1	100,000	2016	Construction
Aurora South Train 2	100,000	2018	Approved
TECK RESOURCES LIMITED			
Frontier			
The Canadian Environmental Assessment Agency estimates the federal review schedule for the project application to be approximately two years, so 2015 would be the earliest approval would be granted. During the first quarter of 2013, Teck says a field exploration program was completed to acquire additional geotechnical information to support future engineering studies.			
Phase 1	74,600	2021	Application
Phase 2	84,000	2024	Application
Phase 3	79,300	2027	Application
Phase 4 Equinox	39,400	2030	Application
TOTAL E&P CANADA LTD.			
Joslyn North Mine			
Project partner Suncor Energy says an updated timing for the Joslyn sanction decision will be made available when it is ready.			
Phase 1	100,000	2018	Approved
NORTH ATHABASCA REGION — IN SITU			
ATHABASCA OIL CORPORATION			
Birch			
Athabasca says that capital expenditures related to Birch in the first quarter related primarily to regulatory compliance activities and preliminary engineering on future site access infrastructure. The company says it continues to prepare its regulatory application (expected to be filed in 2013) and is still reviewing the optimum size of the first phase.			
Phase 1	12,000	TBD	Announced
Dover West Carbonates (Leduc)			
AOC says construction continues on a TAGD heater assembly facility near Strathmore, Alta., which is expected to be commissioned in the second quarter. AOC says it has completed a third production phase at its Dover West TAGD pilot, confirming the production of bitumen from between the two horizontal wellbores, indicating good mobilization at temperatures around 90 degrees Celsius. AOC says it is very encouraged by these results and will seek corporate sanction of the demonstration project as soon as regulatory approval (anticipated this year) is received.			
Phase 1 Demonstration	6,000	2015	Application
Phase 2 Demonstration	6,000	TBD	Application
Dover West Sands & Clastics			
In 2012, AOC acquired approximately 30,000 acres of oil sands leases contiguous to its existing Dover West assets. The company says its Dover West Sands project could now eventually support development up to 270,000 barrels per day. Regulatory approval and internal sanction for the first 12,000-barrel-per-day phase are expected in 2013. AOC says it is leveraging work done on FEED for its Hangingstone project for Dover West.			
Phase 1	12,000	2015	Application
Phase 2	35,000	2018	Announced
Phase 3	35,000	2020	Announced
Phase 4	35,000	2022	Announced
Phase 5	35,000	2024	Announced
BP P.L.C.			
Terre de Grace			
BP says that ongoing appraisal activities include delineation drilling, seismic acquisition and appraisal of water sources.			
Pilot	10,000	TBD	Approved

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS
CANADIAN NATURAL RESOURCES LIMITED			
Birch Mountain			
Canadian Natural says Birch is in the planning stages.			
Phase 1	60,000	2019	Announced
Phase 2	60,000	2023	Announced
CENOVUS ENERGY INC.			
East McMurray			
Phase 1	30,000	TBD	Announced
Steepbank			
Phase 1	30,000	TBD	Announced
Telephone Lake			
Cenovus says it continues to progress the Telephone Lake regulatory application while it operates its dewatering pilot, with water production and air injection proceeding as planned. Regulatory approval is expected in early 2014.			
Phase A	45,000	TBD	Application
Phase B	45,000	TBD	Application
DOVER OPERATING CORP.			
Dover			**Updated: Apr 2013**
In late April, the ERCB began a public hearing for the Dover project to be held in Fort McMurray. Reportedly, the reason for the hearing is that the Fort McKay First Nation says that without a buffer zone, the project will impact the last remaining traditional land on the west side of the Athabasca River. Reports also say that Dover OpCo will soon be changing its name.			
Dover North Phase 1	50,000	2016	Application
Dover North Phase 2	50,000	2018	Application
Dover South Phase 3	50,000	2020	Application
Dover South Phase 4	50,000	2022	Application
Dover South Phase 5	50,000	2024	Application
MacKay River			
Phase 1	35,000	2014	Construction
Phase 2	40,000	2017	Approved
Phase 3	40,000	2019	Approved
Phase 4	35,000	TBD	Approved
E-T ENERGY LTD.			
Poplar Creek			
E-T Energy is advertising its interest in an outright sale, joint venture, farm-in or takeover of its Poplar Creek asset. The management team says the next phase of the project will work with an investment of $35 million.			
Experimental Pilot	1,000	2007	Operating
Phase 1	10,000	TBD	Announced
Phase 2	40,000	TBD	Announced
GRIZZLY OIL SANDS ULC			
Thickwood			
Grizzly filed the regulatory application for the Thickwood project in December 2012.			
Phase 1	6,000	2017	Application
Phase 2	6,000	TBD	Application
HUSKY ENERGY INC.			
Saleski			
Husky filed the regulatory application for its Saleski pilot in early May 2013.			
Carbonate Pilot	3,000	2017	Application
Sunrise			
Husky says construction remains on track and, overall, is approximately 65 per cent complete. The central processing facility is more than half done, with critical equipment delivered and all critical modules for Plant 1A fabricated and delivered to site. Construction of field facilities is approaching 90 per cent completion, and all well pads and pipelines are on target for completion in the second half of 2013. The design basis memorandum for the next phase of development is expected to be completed in the second quarter.			
Phase 1	60,000	2014	Construction
Phase 2	50,000	2016	Approved
Phase 3	50,000	2019	Approved
Phase 4	50,000	TBD	Approved

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS
IMPERIAL OIL LIMITED			
Aspen			
Phase 1	40,000	TBD	Announced
IVANHOE ENERGY INC.			
Tamarack			
Alberta Environment has deemed the environmental impact assessment for the Tamarack project complete.			
Phase 1	20,000	2016	Application
Phase 2	20,000	TBD	Application
MARATHON OIL CORPORATION			
Birchwood			
Marathon filed its regulatory application in 2012. Regulatory approval and project sanctioning are expected in 2013.			
Demonstration	12,000	2017	Application
OAK POINT ENERGY LTD.			
Lewis			
The ERCB and Alberta Environment have approved Oak Point's Lewis project, which is estimated to cost $65 million. The company expects to begin construction in a couple of months and anticipates first steam in approximately one year.			
Pilot	1,720	TBD	Approved
SILVERWILLOW ENERGY CORPORATION			
Audet			
During the first quarter, SilverWillow continued to gather geological and geo-mechanical data to support the filing of a regulatory application. The company says it continues to experience constrained market valuations, but recognizes it is important to keep executing its development plans.			
Pilot	12,000	2016	Announced
SOUTHERN PACIFIC RESOURCE CORP.			
STP-McKay			
Southern Pacific says production averaged 1,000 barrels per day, a decrease month-over-month due to planned maintenance. Production restrictions were in place through most of March on some of the well pairs in order to continue steam chamber conformance while protecting wellbore integrity. It is expected to take up to 18 months (from first oil in October 2012) to reach full design capacity.			
Phase 1	12,000	2012	Operating
Phase 1 Expansion	6,000	2015	Application
Phase 2A	12,000	2017	Application
Phase 2B	6,000	2017	Application
SUNCOR ENERGY INC.			
Dover			
Operations commenced at the N-Solv pilot in December 2012. Solvent injection and first oil were expected in May 2013. Operations will continue until 2015.			
Demonstration Plant	500	2013	Construction
Firebag			
Suncor reports that a steady ramp-up continues at Firebag Stage 4, with production reaching 137,000 barrels per day in the first quarter of 2013. The company anticipates the project will reach full design capacity of 180,000 barrels per day early in 2014.			
Stage 1	35,000	2004	Operating
Stage 2	35,000	2006	Operating
Cogeneration and Expansion	25,000	2007	Operating
Stage 3	42,500	2011	Operating
Stage 4	42,500	2012	Operating
Stage 5	62,500	2018	Approved
Stage 6	62,500	2019	Approved
Stage 3-6 Debottleneck	23,000	TBD	Application
Lewis			
Phase 1	40,000	TBD	Announced
Phase 2	40,000	TBD	Announced
MacKay River			
Suncor says that engineering design specifications continue in preparation for a sanction decision in 2014 for the MacKay River expansion project.			
Phase 1	33,000	2002	Operating
MR2	40,000	2016	Application

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS
SUNSHINE OILSANDS LTD.			
Harper			
Carbonate Pilot	1,000	TBD	Operating
Legend Lake			
Sunshine says regulatory approval for the first 10,000-barrel-per-day phase is expected later in 2013. The company is completing field work for its environmental analysis, which will support work for significant commercial expansion.			
Phase A1	10,000	2016	Application
Phase A2	30,000	TBD	Announced
Phase B1	30,000	TBD	Announced
Phase B2	30,000	TBD	Announced
Thickwood			
Sunshine says regulatory approval is anticipated in the first half of 2013. The company is completing field work for its environmental analysis, which will support plans for significant commercial expansion.			
Phase A1	10,000	2015	Application
Phase A2	30,000	2018	Announced
Phase B	30,000	2021	Announced
West Ells			
Sunshine says the capital cost forecast for the West Ells project has increased to $496 million from the previous estimate of $468 million. Steam injection is now expected to begin near the end of the third quarter or start of the fourth quarter, rather than in the third quarter as previously scheduled.			
Phase A1	5,000	2013	Construction
Phase A2	5,000	2014	Approved
Phase A3	30,000	2018	Announced
Phase B	20,000	2025	Announced
Phase C1	30,000	TBD	Announced
Phase C2	30,000	TBD	Announced
SOUTH ATHABASCA REGION — IN SITU			
ALBERTA OILSANDS INC.			
Clearwater West			
Alberta Oilsands says it has now responded to all outstanding supplemental information requests relating to the Clearwater project application and will continue to work with the ERCB during the coming months to advance approval.			
Phase 1 Pilot	4,350	TBD	Application
Phase 2	25,000	2016	Announced
ATHABASCA OIL CORPORATION			
Hangingstone			
AOC says that site preparation on Hangingstone Phase 1 continued in the first quarter of 2013. Detailed engineering is now over 70 per cent complete and the project is on time and on budget. The company has entered into an agreement with Enbridge Inc. for dilbit transportation and terminalling.			
Phase 1	12,000	2014	Construction
Phase 2	35,000	2017	Announced
Phase 3	35,000	2019	Announced
BLACKPEARL RESOURCES INC.			
Blackrod			
BlackPearl says that during the first quarter the company drilled a second SAGD well pair at Blackrod, and steam injection is expected to commence this summer. The company continues to optimize production techniques with the first well pair, and with the most recent modifications, production is headed back towards commercial rates. Detailed engineering for the first commercial phase of development continues.			
Pilot	800	2011	Operating
Phase 1	20,000	2015	Application
Phase 2	30,000	2018	Application
Phase 3	30,000	2021	Application
CANADIAN NATURAL RESOURCES LIMITED			
Gregoire Lake			
Canadian Natural says Gregoire Lake is in the planning stages.			
Phase 1	60,000	TBD	Announced
Phase 2	60,000	TBD	Announced
Grouse			
Canadian Natural says Grouse is in the planning stages. First production is expected between 2017 and 2019.			
Commercial	50,000	TBD	Application
Kirby North			
Canadian Natural says that as of March 31, detailed engineering is 45 per cent complete. Construction of the main access road is complete, and site preparation will continue into the third quarter. The project will be submitted for corporate sanction in the third quarter.			
Phase 1	40,000	2016	Application
Phase 2	60,000	2023	Application
Kirby South			
Canadian Natural says construction of Phase 1 remains ahead of schedule and on budget. Drilling is on track to complete the seventh and final well pad in Q2. Late in the second quarter, the focus will shift from construction to commissioning with first steam now scheduled for Q3, ahead of the original schedule of November 2013.			
Phase 1	40,000	2013	Construction
Phase 2	20,000	2020	Application
CAVALIER ENERGY INC.			
Hoole			
Cavalier continues front-end engineering and design work for the first 10,000-barrel-per-day phase at Hoole, along with geotechnical work and drilling additional source water and disposal wells. The company anticipates regulatory approvals by mid-2014 and continues to evaluate funding alternatives.			
Phase 1	10,000	2017	Application
Phase 2	35,000	TBD	Announced
Phase 3	35,000	TBD	Announced
CENOVUS ENERGY INC.			
Christina Lake			
Cenovus says Phase D demonstrated full production capacity in January 2013, approximately six months after first production. Phase E is about 90 per cent complete. Procurement, plant construction and major equipment fabrication continues for Phase F, while engineering work continues for Phase G.			
Phase 1A	10,000	2002	Operating
Phase 1B	8,800	2008	Operating
Phase C	40,000	2011	Operating
Phase D	40,000	2012	Operating
Phase E	40,000	2013	Construction
Phase F	50,000	2016	Construction
Phase G	50,000	2017	Approved
Phase H	50,000	2019	Application
Future Optimization	12,000	TBD	Announced
Foster Creek			
Cenovus says that overall progress on the combined Phase F, G and H expansion is about 46 per cent complete, while the Phase F central plant is about 73 per cent complete. Module assembly and piling work continues on Phase G, while site preparation, piling work and major equipment procurement are underway for Phase H.			
Phase A	24,000	2001	Operating
Phase B Debottleneck	6,000	2003	Operating
Phase C Stage 1	10,000	2005	Operating
Phase C Stage 2	20,000	2007	Operating
Phase D	30,000	2009	Operating
Phase E	30,000	2009	Operating
Phase F	45,000	2014	Construction
Phase G	40,000	2015	Approved
Phase H	40,000	2016	Approved
Phase J	50,000	2019	Application
Future Optimization	15,000	TBD	Announced
Grand Rapids			
Cenovus says first production from a second well pair at the Grand Rapids pilot was achieved in February, and that the regulatory application for the commercial project is proceeding on schedule.			
Pilot	600	2011	Operating
Phase A	60,000	2017	Application
Phase B	60,000	TBD	Application
Phase C	60,000	TBD	Application

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS
Narrows Lake			
Cenovus says that site preparation, which began in the third quarter of 2012, is progressing as expected, as are engineering and procurement. Construction of the Phase A plant is scheduled to start up in the third quarter of 2013.			
Phase A	45,000	2017	Construction
Phase B	45,000	TBD	Approved
Phase C	40,000	TBD	Approved
West Kirby			
Phase 1	30,000	TBD	Announced
Winefred Lake			
Phase 1	30,000	TBD	Announced
CONNACHER OIL AND GAS LIMITED			
Great Divide			
During the first quarter, Connacher drilled one new well pair at Algar and four new well pairs at Pod One. The company has a number of initiatives underway to improve netbacks, including its "fill the plant" production strategy, rail transport of bitumen (55 per cent of production in the first quarter), and its diluent recovery unit (DRU) project, which is expected to reduce the amount and cost of diluent. The DRU project has been sanctioned.			
Pod One	10,000	2007	Operating
Algar	10,000	2010	Operating
Expansion 1A	12,000	TBD	Approved
Expansion 1B	12,000	TBD	Approved
CONOCOPHILLIPS CANADA			
Surmont			
ConocoPhillips reports it has not found a buyer or partner for 50 per cent of its oil sands holdings, including Surmont, but is not that concerned about it because the company has recently generated more than $10 billion in asset sales from elsewhere in its portfolio.			
Pilot	1,200	1997	Operating
Phase 1	27,000	2007	Operating
Phase 2	109,000	2015	Construction
DEVON CANADA CORPORATION			
Jackfish			
Devon says production at Jackfish continues to achieve record rates, averaging 54,000 barrels per day in the first quarter of 2013, an 18 per cent increase over the first quarter of 2012. Construction on Jackfish 3 is approximately 60 per cent complete.			
Phase 1	35,000	2007	Operating
Phase 2	35,000	2011	Operating
Phase 3	35,000	2015	Construction
Jackfish East			
Expansion	20,000	2018	Announced
Pike			
Devon says the Pike project continues to move through the regulatory process.			
1A	35,000	2016	Application
1B	35,000	2017	Application
1C	35,000	2018	Application
GRIZZLY OIL SANDS ULC			
Algar Lake			
Grizzly has begun commissioning the Algar Lake project and expects first production during the third quarter of 2013.			
Phase 1	5,500	2013	Construction
Phase 2	5,500	2014	Approved
May River			
Grizzly part-owner Gulfport Energy says the company continues to work towards filing regulatory applications for a 12,000-barrel-per-day SAGD project at May River by the end of 2013.			
Phase 1	6,800	TBD	Announced
Phase 2	6,800	TBD	Announced
HARVEST OPERATIONS CORP.			
BlackGold			
Harvest says that construction of the central processing facility is approximately 92 per cent complete and the processing facility construction is approximately 50 per cent complete.			
Phase 1	10,000	2014	Construction
Phase 2	20,000	TBD	Application
HUSKY ENERGY INC.			
McMullen			
Husky says that cold production development continues at McMullen, while at the air injection pilot, ongoing testing and monitoring of the producer is continuing as planned. Production from an additional two horizontal wells at the pilot is anticipated later in the year.			
Air Injection Pilot-Experimental	755	2012	Operating

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS
JAPAN CANADA OIL SANDS LIMITED			
Hangingstone			
Japan Canada Oil Sands owner JAPEX has sanctioned the Hangingstone expansion project. Project partner Nexen is expected to sanction its share of the development early in 2013.			
Expansion	20,000	2016	Approved
Hangingstone Pilot			
Pilot	11,000	1999	Operating
KOCH EXPLORATION CANADA CORPORATION			
Muskwa			
Koch put a number of undeveloped oil sands holdings, including Muskwa, up for sale in June 2012. The company now says that "some" of these assets have been purchased (such as the Gemini SAGD project, sold to Baytex Energy Corp.), but it has elected to retain the rest.			
Pilot	10,000	2015	Application
LARICINA ENERGY LTD.			
Germain			
Laricina says it is in the final stages of construction at Germain. The final four well pairs were completed in January, and the final modules were delivered in February. Commissioning has already commenced on certain systems. First steam is scheduled for the end of June, with first production targeted in early fall. The project is on track for a budget of $435 million, and Laricina says it has identified several areas to improve costs for future well pairs at both Germain and Saleski.			
Phase 1 CDP	5,000	2013	Construction
Phase 2	30,000	2016	Application
Phase 3	60,000	TBD	Application
Phase 4	60,000	TBD	Application
Saleski			
Laricina says it has demonstrated that Saleski operates best using cyclic SAGD and can produce at commercial rates. Ongoing optimization continues. The company anticipates regulatory approval for its first commercial phase in mid-2013. It has responded to two rounds of supplemental information requests regarding its application.			
Experimental Pilot	1,800	2011	Operating
Phase 1	10,700	2015	Application
Phase 6	60,000	TBD	Announced
MEG ENERGY CORP.			
Christina Lake			
MEG achieved record production at Christina Lake in the first quarter of 32,521 barrels per day. Wider deployment of its enhanced modified steam and gas push technology is underway. The company says initial steaming at 2B remains on schedule for Q3, with full plant operations targeted to ramp up in Q4.			
Phase 1 Pilot	3,000	2008	Operating
Phase 2A	22,000	2009	Operating
Phase 2B	35,000	2013	Construction
Phase 3A	50,000	2016	Approved
Phase 3B	50,000	2018	Approved
Phase 3C	50,000	2020	Approved
Surmont			
MEG says that during Q1, a total of 24 stratigraphic wells, one water source well and three water test wells were completed at Surmont.			
Phase 1	41,000	2018	Application
Phase 2	41,000	TBD	Application
Phase 3	41,000	TBD	Application
NEXEN INC.			
Long Lake			
The $15.1-billion acquisition of Nexen by CNOOC was completed in February 2013. Nexen will continue to operate as a subsidiary of CNOOC.			
Phase 1	72,000	2008	Operating
Phase 2	72,000	TBD	Approved
Phase 3	72,000	TBD	Application
Phase 4	72,000	TBD	Announced
Long Lake South (Kinosis) Phase 1	40,000	TBD	Approved
Long Lake South (Kinosis) Phase 2	40,000	TBD	Approved

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS
OSUM OIL SANDS CORP.			
Sepiko Kesik			
Osum says it anticipates regulatory approval for Sepiko Kesik in 2014.			
Phase 1	30,000	2018	Application
Phase 2	30,000	2020	Application
STATOIL CANADA LTD.			
Kai Kos Dehseh			
Project partner PTT Exploration and Production says that during Q4/2012, detailed engineering was completed on a fifth well pad, and construction on the pad began. First steam is expected in Q4/2013. The project also completed tie-in works to one pad for a solvent co-injection project, with first injection expected in April 2013. Front-end engineering and design has begun for the Corner project.			
Leismer Demonstration	10,000	2010	Operating
Corner	40,000	2017	Approved
Leismer Commercial	10,000	TBD	Approved
Leismer Expansion	20,000	TBD	Approved
Corner Expansion	40,000	TBD	Application
Hangingstone	20,000	TBD	Application
Leismer Northwest	20,000	TBD	Application
Leismer South	20,000	TBD	Application
Thornbury	40,000	TBD	Application
Thornbury Expansion	20,000	TBD	Application
SUNCOR ENERGY INC.			
Chard			
Phase 1	40,000	TBD	Announced
Meadow Creek			
Phase 1	40,000	TBD	Approved
Phase 2	40,000	TBD	Approved
SURMONT ENERGY LTD.			
Wildwood			
Phase 1	12,000	2015	Application
VALUE CREATION INC.			
Advanced TriStar			
Value Creation has submitted an environmental assessment report for the Advanced TriStar project.			
ATS-1	15,000	2016	Application
ATS-2	30,000	2018	Application
ATS-3	30,000	2020	Application
TriStar			
Pilot	1,000	2014	Application
COLD LAKE REGION — IN SITU			
BAYTEX ENERGY CORP.			
Gemini			**Updated: May 2013**
Baytex says that during the first quarter, preliminary work continued on the Gemini SAGD project, including installation of groundwater monitoring wells and facility engineering and design. Construction of the SAGD pilot is expected to begin in the second quarter.			
Pilot	1,200	TBD	Approved
Commercial	5,000	2016	Approved
BIRCHWOOD RESOURCES INC.			
Sage			
Birchwood has filed its regulatory application for the $230-million Sage project. Propak Systems of Airdrie, Alta., will execute modular surface facility construction.			
Pilot	5,000	2015	Application
CANADIAN NATURAL RESOURCES LIMITED			
Primrose & Wolf Lake			
Canadian Natural says Primrose generates returns among the highest in the company's portfolio, with operating costs below $11 per barrel. The company plans to drill 100–120 wells per year at Primrose over the next five to 10 years, enabling it to maintain production between 120,000 and 125,000 barrels per day. Engineering studies are being undertaken in 2013 to evaluate the expansion of Primrose facilities to accelerate the development of new pad additions.			
Primrose East	32,000	2008	Operating
Primrose North	30,000	2006	Operating
Primrose South	45,000	1985	Operating
Wolf Lake	13,000	1985	Operating

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS
DEVON CANADA CORPORATION			
Walleye			
Devon says the Walleye project has been deferred by a year and will be assessed for inclusion in its 2014 budget.			
Phase 1	9,000	2017	Application
HUSKY ENERGY INC.			
Caribou			
Demonstration	10,000	TBD	Approved
Tucker			
Husky says that during Q4/2012, drilling commenced on five new Grand Rapids well pairs at Tucker.			
Phase 1	30,000	2006	Operating
IMPERIAL OIL LIMITED			
Cold Lake			
Imperial says that at the end of Q1/2013, the Nabiye expansion project was 42 per cent complete.			
Phases 1-10	110,000	1985	Operating
Phases 11-13	30,000	2002	Operating
Phases 14-16	40,000	2014	Construction
OSUM OIL SANDS CORP.			
Taiga			
Osum says engineering work is underway, and some long-lead items have been ordered. Project sanction is expected in 2013.			
Phase 1	23,000	2015	Approved
Phase 2	22,000	2017	Approved
PENGROWTH ENERGY CORPORATION			
Lindbergh			
Pengrowth's management has sanctioned the first 12,500-barrel-per-day commercial phase at Lindbergh, based on positive pilot results in 2012. Subject to environmental approval (expected this summer), construction is expected to begin. The company says operations at the pilot project continue to show strong results.			
Pilot	1,200	2012	Operating
Phase 1	12,500	2015	Application
Phase 2	17,500	2017	Announced
Phase 3	20,000	2018	Announced
ROYAL DUTCH SHELL PLC			
Orion			
Shell had previously put up for sale its Orion asset, but says it has not received any offers that reflect its value and has ended sale activities.			
Phase 1	10,000	2007	Operating
Phase 2	10,000	TBD	Approved
PEACE RIVER REGION — IN SITU			
ANDORA ENERGY CORPORATION			
Sawn Lake			
Andora Energy majority owner Pan Orient Energy says activities are currently underway for drilling of the SAGD well pair in the third quarter and start up of steam operations in the fourth quarter of 2013. The company says $2.2 million was spent in the first quarter of 2013 on design and engineering, site preparation and equipment purchases.			
Demonstration	1,400	2014	Approved
BAYTEX ENERGY CORP.			
Cliffdale			
Baytex says that successful operations continued at its 10-well Cliffdale CSS module in the first quarter, with bitumen production averaging over 500 barrels per day with a cumulative steam to oil ratio of 2.4:1. In late March, the company received approval for a new 15-well CSS module. Facility construction is underway and drilling operations are expected to commence mid-year.			
Pilot	2,000	2010	Operating
Harmon Valley			
Pilot	TBD	2011	Operating
MURPHY OIL COMPANY LTD.			
Cadotte			
Pilot	TBD	TBD	On Hold
Seal/Cadotte			
Pilot	TBD	2012	Operating

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS
NORTHERN ALBERTA OIL LTD.			
Sawn Lake			
Company owner Deep Well Oil & Gas says WorleyParsons has launched preliminary engineering work on the Sawn Lake pilot project. The work will include a pilot plan; process flow diagrams; material balances for hydrocarbons, sulphur and water; description of the capacity; and content of emissions.			
Pilot	700	TBD	Approved
PENN WEST PETROLEUM LTD.			
Harmon Valley South			
Penn West says it continues to progress its three-well thermal pilot at Harmon Valley South, which is expected to commence steam injection in the second half of 2013.			
Pilot	TBD	TBD	Construction
Seal Main			
Pilot	75	2011	Operating
Commercial	10,000	2015	Application
PETROBANK ENERGY AND RESOURCES LTD.			
Dawson			
Petrobank commenced cold production operations from both horizontal THAI production wells in late 2012 and says the wells produced at a combined rate of approximately 20 barrels per day in the first quarter of 2013. These wells are helping to pre-condition the well for THAI operations.			
Experimental THAI Demonstration	10,000	2013	Construction
Phase 2	10,000	TBD	Announced
ROYAL DUTCH SHELL PLC			
Peace River			
Shell has received regulatory approval for the Carmon Creek project, for which it applied more than three years ago. A final investment decision could come this year.			
Cadotte Lake	12,500	1986	Operating
Carmon Creek - Phase 1	40,000	2015	Approved
Carmon Creek - Phase 2	40,000	2018	Approved
SOUTHERN PACIFIC RESOURCE CORP.			
Red Earth			
Southern Pacific says the cyclic steam stimulation pilot at Red Earth is currently shut in.			
Pilot	1,000	2009	On Hold
Pilot Expansion	3,000	TBD	Announced
Commercial	10,000	TBD	Announced
NORTH ATHABASCA REGION — UPGRADER			
BP P.L.C.			
Terre de Grace			
BP says that ongoing appraisal activities include delineation drilling, seismic acquisition and appraisal of water sources.			
Pilot	8,400	TBD	Approved
CANADIAN NATURAL RESOURCES LIMITED			
Horizon			
Canadian Natural says during the first quarter, the Horizon project achieved strong, reliable production volumes, reflecting a steady, sustained increase in reliablity over the last year as the company focuses on enhanced maintenance strategy and operational discipline. Overall, the Phase 2/3 expansion is 20 per cent complete.			
Phase 1	114,000	2009	Operating
Tranche 2	5,000	TBD	Operating
Phase 2A	10,000	2015	Construction
Phase 2B	45,000	2016	Construction
Phase 3	80,000	2017	Construction
IVANHOE ENERGY INC.			
Tamarack			
Alberta Environment has deemed the environmental impact assessment for the Tamarack project complete.			
Phase 1	34,784	2016	Application

CURRENT PROJECT	CAPACITY	START-UP	REGULATORY STATUS
SUNCOR ENERGY INC.			
Base Operations			
Suncor says that during the first quarter of 2013, oil sands production numbers increased by approximately 50,000 barrels per day compared to the corresponding period of 2012, thanks in part to stronger upgrader reliability.			
U1 and U2	225,000	1967	Operating
Millennium Vacuum Unit	35,000	2005	Operating
Millennium Coker Unit	97,000	2008	Operating
Voyageur Upgrader 3			
Suncor has announced it will not proceed with the Voyageur Upgrader. Total is no longer a partner on the project.			
Phase 1	127,000	2016	Cancelled
Phase 2	63,000	TBD	Cancelled
SYNCRUDE CANADA LTD.			
Mildred Lake/Aurora			
Canadian Oil Sands Limited says Syncrude experienced several unplanned outages during the first quarter of 2013, but progress has been made in the operations area, with the facility experiencing optimal 36-month run lengths for two of three of its cokers.			
Base Plant Stage 1 & 2 Debottleneck	250,000	1978	Operating
Stage 3 Expansion (UE-1)	100,000	2006	Operating
Stage 3 Debottleneck	75,000	TBD	Announced
SOUTH ATHABASCA REGION — UPGRADER			
NEXEN INC.			
Long Lake			
The $15.1-billion acquisition of Nexen by CNOOC was completed in February 2013. Nexen will continue to operate as a subsidiary of CNOOC.			
Phase 1	58,500	2008	Operating
Phase 2	58,500	TBD	Approved
Phase 3	58,500	TBD	Application
Phase 4	58,500	TBD	Announced
VALUE CREATION INC.			
Advanced TriStar			
Value Creation has submitted an environmental assessment report for the Advanced TriStar project.			
ATS-1	12,750	2016	Application
ATS-2	25,500	2018	Application
ATS-3	25,500	2020	Application
TriStar			
Pilot	840	2014	Application
INDUSTRIAL HEARTLAND REGION — UPGRADER			
NORTH WEST UPGRADING INC.			
Redwater Upgrader			
North West Upgrading says its project team has grown to over 350 people, and it is expanding office space in the Town of Redwater, Alta. Winter conditions following project sanction have meant that much of the preliminary site preparation work will have to wait until spring 2013, but design work continues by about 1,000 technical staff. Some pipeline relocation work within and near the site is planned for Q1 and early Q2; major civil works contracts will be executed in spring and summer, followed by deep underground piping and foundation work and site mechanical construction.			
Phase 1	50,000	2016	Approved
Phase 2	50,000	TBD	Approved
Phase 3	50,000	TBD	Approved
SHELL ALBIAN SANDS			
Scotford Upgrader 1			
Minority partner Marathon Oil Corporation says upgrader availability was 100 per cent during the first quarter of 2013, allowing the facility to maximize production of lighter synthetic crudes. This improved realizations and profit margins.			
Commercial	155,000	2003	Operating
Expansion	100,000	2011	Operating
VALUE CREATION INC.			
Heartland			
Reports are that Value Creation could be up and running within 18 months of project sanction, but funding remains unclear.			
Phase 1	46,300	TBD	On Hold
Phase 2	46,300	TBD	Approved
Phase 3	46,300	TBD	Approved

GLOSSARY of oilsands terms

Asphaltenes
The heaviest and most concentrated aromatic hydrocarbon fractions of bitumen.

Barrel
The traditional measurement for crude oil volumes. One barrel equals 42 U.S. 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 oil sand, but saturation varies.

Coking
An upgrading/refining process used to convert the heaviest fraction of bitumen into lighter hydrocarbons by rejecting carbon as coke. Coking can be either delayed coking (semi-batch) or fluid coking (continuous).

Cogeneration
The simultaneous production of electricity and steam, which is part of the operations of many oil sands projects.

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.

Conventional crude oil
Mixture of mainly pentane and heavier hydrocarbons recoverable at a well from an underground reservoir, and liquid at atmospheric pressure and temperature. Unlike bitumen, it flows through a well without stimulation and through a pipeline without processing or dilution.

Cracking
An upgrading/refining process for converting large, heavy molecules into smaller ones. Cracking processes include fluid cracking and hydrocracking.

Cyclic steam stimulation (CSS)
An in situ production method incorporating cycles of steam injection, steam soaking and oil production. The steam reduces the viscosity of the bitumen and allows it to flow to the production well.

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.

Dilbit
Bitumen that has been reduced in viscosity through addition of a diluent such as condensate or naphtha.

Diluent
A light hydrocarbon blended with bitumen to enable pipeline transport. See *Condensate*.

Extraction
A process, unique to the oil sands industry, that separates the bitumen from the oil sand 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 by-products.

Groundwater
Water accumulations below the Earth's surface that supply fresh water to wells and springs.

Heavy crude oil
Oil with a gravity below 22 degrees API. Heavy crudes must be blended or mixed with condensate to be shipped by pipeline.

Hydrocracking
Refining process for reducing heavy hydrocarbons into lighter fractions, using hydrogen and a catalyst; can also be used in upgrading bitumen.

Hydrotransport
A slurry process that transports water and oil sand through a pipeline to primary separation vessels located in an extraction plant.

Hydrotreater
An upgrading/refining process unit that reduces sulphur and nitrogen levels in crude oil fractions by catalytic addition of hydrogen.

In situ
A Latin phrase meaning "in its original place." In situ recovery refers to various drilling-based methods used to recover deeply buried bitumen deposits.

In situ combustion
An enhanced oil recovery method that works by generating combustion gases (primarily CO and CO_2) downhole, which then "push" the oil toward the recovery well.

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

Light crude oil
Liquid petroleum with a gravity of 28 degrees API or higher. A high-quality light crude oil might have a gravity of about 40 degrees API. Upgraded crude oils from the oil sands run around 30–33 degrees API (compared to 32–34 for Light Arab and 37–40 for West Texas Intermediate).

Mature fine tailings
A gel-like material resulting from the processing of clay fines contained within the oil sands.

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

Overburden
A layer of sand, gravel and shale between the surface and the underlying oil sand in the mineable oil sands region that must be removed before oil sands can be mined.

Permeability
The capacity of a substance (such as rock) to transmit a fluid, such as crude oil, natural gas or water. The degree of permeability depends on the number, size and shape of the pores and/or fractures in the rock and their interconnections. It is measured by the time it takes a fluid of standard viscosity to move a given distance. The unit of permeability is the Darcy.

Petroleum coke
Solid, black hydrocarbon that is left as a residue after the more valuable hydrocarbons have been removed from the bitumen by heating the bitumen to high temperatures.

Primary production
An in situ recovery method that uses natural reservoir energy (such as gas drive, water drive and gravity drainage) to displace hydrocarbons from the reservoir into the wellbore and up to the surface. Primary production uses an artificial lift system in order to reduce the bottomhole pressure or increase the differential pressure to sustain hydrocarbon recovery, since reservoir pressure decreases with production.

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

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.

Surface mining
Operations to recover oil sands by open-pit mining using trucks and shovels. Less than 20 per cent of Alberta's oil sands resources are located close enough to the surface (within 75 metres) for mining to be economic.

Synthetic crude oil
A manufactured crude oil comprised of naphtha, 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 by-product of removing the bitumen from the oil sand through the extraction process.

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 that 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 in situ process where heat energy (generally steam) is used to reduce the viscosity of bitumen to facilitate recovery.

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).

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

CONTACTS

Oil Sands Producers

Alberta Oilsands	www.aboilsands.ca
Andora Energy	www.andoraenergy.com
Athabasca Oil Corporation	www.atha.com
Baytex Energy	www.baytex.ab.ca
BlackPearl Resources	www.blackpearlresources.ca
Brion Energy Corporation	www.brionenergy.com
Canadian Natural Resources	www.cnrl.com
Cenovus Energy	www.cenovus.com
Chevron Canada	www.chevron.ca
China National Offshore Oil Corporation	www.cnoocltd.com
Connacher Oil and Gas	www.connacheroil.com
ConocoPhillips Canada	www.conocophillips.ca
Devon Canada	www.dvn.com
Enerplus Resources Fund	www.enerplus.com
E-T Energy	www.e-tenergy.com
Grizzly Oil Sands	www.grizzlyoilsands.com
Harvest Operations Corp.	www.harvestenergy.ca
Husky Energy	www.huskyenergy.ca
Imperial Oil	www.imperialoil.ca
Ivanhoe Energy	www.ivanhoeenergy.com
Japan Canada Oil Sands	www.jacos.com
Koch Exploration Canada	www.kochind.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 West Upgrading	www.northwestupgrading.com
N-Solv	www.n-solv.com
Oak Point Energy	www.oakpointenergy.ca
Occidental Petroleum Corporation	www.oxy.com
Osum Oil Sands	www.osumcorp.com
Pan Orient Energy	www.panorient.ca
Paramount Resources Ltd.	www.paramountres.com
Pengrowth Energy Trust	www.pengrowth.com
Petrobank Energy and Resources	www.petrobank.com
PetroChina	www.petrochina.com.cn/Ptr
Shell Canada	www.shell.ca
Sinopec	english.sinopec.com
Southern Pacific Resource Corp.	www.shpacific.com
Statoil Canada	www.statoil.com
Suncor Energy	www.suncor.com
Sunshine Oilsands	www.sunshineoilsands.com
Syncrude	www.syncrude.ca
Talisman Energy	www.talisman-energy.com
Teck Resources	www.teck.com
Total E&P Canada	www.total-ep-canada.com
Value Creation Group	www.vctek.com

Associations/Organizations

Alberta Building Trades Council	www.buildingtradesalberta.ca
Alberta Chamber of Resources	www.acr-alberta.com
Alberta Chambers of Commerce	www.abchamber.ca
Alberta Energy	www.energy.gov.ab.ca
Alberta Energy Regulator	www.aer.ca
Alberta Enterprise and Advanced Education	www.eae.alberta.ca
Alberta Innovates	www.albertainnovates.ca
Alberta Environment and Sustainable Resource Development	www.srd.alberta.ca
Alberta's Industrial Heartland Association	www.industrialheartland.com
Canada's Oil Sands Innovation Alliance	www.cosia.ca
Canadian Association of Geophysical Contractors	www.cagc.ca
Canadian Association of Petroleum Producers	www.capp.ca
Canadian Heavy Oil Association	www.choa.ab.ca
In Situ Oil Sands Alliance	www.iosa.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
Oil Sands Secretariat	www.energy.alberta.ca
Petroleum Technology Alliance Canada	www.ptac.org

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