Line Rider
Global Employee eMagazine

Chevron

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Beating the Tar Out of Sand for Oil

Two Tons of Canadian Oil Sands Produce One Barrel of Bitumen.

by Renee Silveira

Some of the petroleum Mother Nature provides in Alberta, a province of Canada, isn't "ready made" for refining. Bitumen – heavy, viscous and co-mingled with sand, clay, water and trace minerals – needs to be extracted and upgraded before even a dribble can be processed into gasoline and other petroleum products.

Find Out About:

- Refining oil sands
- Bitumen's role
- Our new oil sands move

According to Alberta's Energy and Utilities Board, some 178.7 billion barrels of bitumen are recoverable from the oil sands of the province. That's second only to the estimated oil reserves of Saudi Arabia.

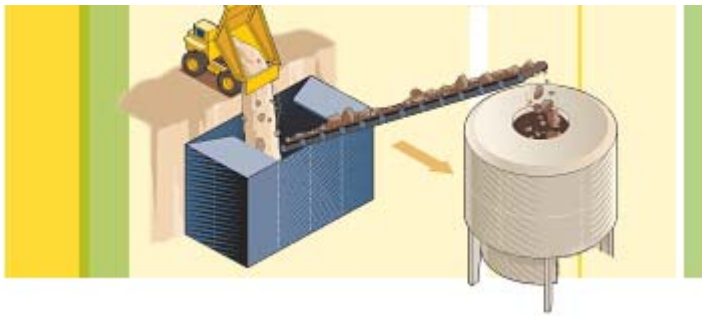
About 20 percent of that bitumen is shallow enough for surface mining. That's the method used in the Athabasca Oil Sands Project (AOSP), our joint venture with Shell Canada Ltd. and Western Oil Sands Inc. We own a 20 percent share as does Western Oil Sands, and Shell is the operator with a 60 percent interest.

The agreement was signed in December 1999, and the Muskeg River Mine, its processing facilities, the Scotford Upgrader to the south as well as the Corridor Pipeline linking them were constructed and fully operational by mid-2003.

Since then, AOSP has produced more than 100 million barrels of bitumen. It takes approximately two tons of oil sands to produce one barrel (42 gallons, or 159 liters) of bitumen.

Mining

The Muskeg River Mine, located north of Fort McMurray, operates around the clock every day of the year. Muskeg is the land type of the area, a watery bog formed by layers of decaying plant matter. Once an area of vegetation is cleared, the muskeg and underlying claylike layer are removed, exposing the oil sands.



Surface Mining

The sands are then dug out with mammoth shovels – each bucket holding as much as 100 tons of sand – and are unloaded, along with co-mingled clay, into heavy-hauler trucks. The trucks, approximately 30 feet (9 m) wide and 48 feet (15 m) long, are 20 feet (6 m) tall – close to the height of a two-story building. These are among the largest mining trucks in the world, and each can hold 400 tons.

The trucks carry their loads to a crusher that breaks up the oil sands into chunks which are then moved by conveyer belt to a storage silo. Pieces 18 inches (45 cm) or less in diameter leave the unit and pass into a rotating drum that further reduces the size of the chunks to about 2 inches (5 cm).

Warm water is added to the small lumps of oil sands as they leave the drum and pass into a pipeline where they are mixed, creating a slurry.

Extraction

The slurry is fed into a unit where the mixture is separated into three layers - sand, water and bitumen. The bitumen is the frothy upper layer skimmed off the top. Water (the middle layer) and sand and pebbles (the lower layer) constitute the “tailings.” Additional recovery of bitumen is made possible by stirring the dirt and sand left over after first removal of bitumen and adding air. The tailings are stored in a settling pond, with the water reused for the processing.

The extracted bitumen passes into units where it is washed with a special solvent.

Turning slurry into oil

Corridor Pipeline

The extracted bitumen is clean but still viscous, so it needs to be diluted before it can flow through the pipeline to the upgrader. The special solvent used in the extraction process is also used as the diluent for this purpose. Outdoor tanks at the mining facility hold the diluted bitumen until it is released into the 24-inch-diameter (61-cm) pipeline leading to the Scotford Upgrader some 280 miles (450 km) to the south.

Upgrading

At the upgrading facility, synthetic crude oil is created in a process called hydroconversion in which the bitumen is broken into smaller molecules by adding hydrogen in the presence of heat, pressure and a catalyst (a material that speeds up a reaction but isn’t itself affected or

consumed in that process). The process also removes sulfur and nitrogen. The “syncrude” is sold to Shell’s adjacent Scotford Refinery and many other customers around the world.

Deeper Ventures Ahead

In March, we announced acquisition of five heavy oil leases, also in the Athabasca region of northern Alberta. Twenty-four miles (40 km) southwest of AOSP, the leases comprise approximately 75,000 acres (300 sq km) and include an estimated 7.5 billion barrels of oil in place.

The resource is situated deeper and can’t be surface mined, so in situ methods such as steam-assisted gravity drainage, which involves horizontal drilling to extract the bitumen, will be used. We will be the operator of this venture, and Shell and Western Oil Sands have the right to each acquire a 20 percent working interest in these leases.

The rules of the United States Securities and Exchange Commission (SEC) permit oil and gas companies to disclose in their filings with the SEC only proved reserves. Also, SEC regulations define proved oil sands reserves as mining-related and not part of conventional oil and gas reserves. Investors should refer to disclosures in Chevron's Annual Report on Form 10-K for the year ended December 31, 2005 for information about the company's crude oil, condensate and natural gas proved reserves and oil sands mining-related proved reserves.

Creating the Oil Field of the Future

I-field Project to Pump Reliability

by Chris Forsyth

Before reliability became a key standard, Chevron took an innovative step in 2002 and began creating the oil field of the future.

Find Out About:

- Our i-field progress
- Pacesetting Carthage i-field
- Oil Fields working like factories

Called "i-field" ("i" for "integration") it's developing in the United States at the maturing Carthage gas field in East Texas and at seven other fields worldwide to dramatically improve reliability.

"The digital oil field of tomorrow is closer to reality than many may think," says Jayne Sieverding, business development manager for Chevron Energy Technology Company.

Victor Villagran (right), Carthage Field project manager, works on a laptop with David Hodges, electronic instrumentation specialist, near a plunger lift controller and gas well.

Carthage is the closest to automatically preventing spills, regulating pressure and temperatures--all reliability issues_saving decision-making time, reducing costs, and driving substantial new levels of productivity from old operations.

Our workers in the rolling, wooded plains of East Texas are driving toward the tremendous competitive advantage that comes with operating instrumented fields, collecting "real-time" data and turning it into valuable information upon which to base decisions. "Real-time" means providing production technologists with what they want when they want it in the way they want.

Early indications at Carthage are validating the expected production increases and time savings, say Trond Unneland, Chevron's Norway country manager who helped develop the initial governance model for i-fields, and Mike Hauser, i-field program manager for North America Upstream.

Carthage and the other seven i-fields currently being prepared will use developments in sensors, monitoring, and optimization tools that anticipate and plan based on what's happening and continually adjust to operating circumstances.

The vision is to turn oil and gas fields into modern factories with coordinated information-intensive technology, say Trond and Mike.

"We're working to create environments where people spend less time gathering and deciphering all kinds of different data and more time making decisions,"says Vice President Warner Williams, who oversees our major California oil fields, including San Ardo where another i-field is being prepared.

"The key is knowing when, where and how to intervene in a production operation," explains Warner. "Instead of going around checking every little thing, i-field should help us assess operations continuously and quickly. When we find exceptions, that's where we'll make interventions."

Carthage's old "low-tech" instrumentation and surveillance, for example, was more suited to pickups than to today's temperature controlled operations rooms. Victor Villagran, the Carthage i-field project manager, describes the old way of operators driving out and manually recording and scanning data at dozens of wells. It was a slow error-prone process. Today, engineers use laptops and handheld devices to track wells and proactively prevent disruptions.

Another example where sophisticated technology is being integrated into a mature operation is also in the U.S. at the Cymric field in the San Joaquin Valley of California. The initial project is a greenfield steam driven development that could be adding new production by 2008, says Warner. Here, the production technologist employs an artificial intelligence tool to optimize the cyclic steam injection timing for a large pattern of wells. This results in significantly improved decision making and efficiency.

An i-field project is also being designed for shallow-water operations in the U.K. North Sea, anchored by the Captain Field. Another pacesetting i-field project, Tahiti in the deepwater U.S. Gulf of Mexico, is incorporating elements in the operational design.

Meanwhile, Victor is looking forward to the day that Carthage-with 650 wells over 1,000 square miles (2,590 sq km)-can be managed from a single location, possibly from Houston, about 196 miles (315 km) south.

"In time, we'll be able to see the whole operation and manage it from a central point," says Victor.

Putting Information to Work Globally

Project Olympic Progresses on Creating the 'Enterprise Culture'

by Chris Forsyth

Project Olympic is Downstream's drive to standardize the way it does business worldwide. From Human Resources (HR) to supply chain to customer order and delivery, people from around the world are building common business practices and a single information system in order to realize the potential of Downstream's global functional organization.

Find Out About:

- What 'Enterprise Culture' is
- 880 differences
- Global standardization

A glimpse into the breathtaking scale of what's involved came in February as the Olympic team analyzed its first six months' work in Project 1, the first of three projects-in a five-year-effort. Project 1 will consolidate HR information globally and will standardize financial, sales, procurement and supply chain processes in Brazil, Asia-Pacific and Africa. Except for Brazil, deployment will be in countries that currently employ SAP as their information system.

A central goal is the worldwide consolidation of data that now reside in 88 business systems and 64 HR systems. The consolidated system will use an SAP design recently deployed in the United States. Access to the data will enable Downstream to greatly improve and streamline its supply chain and procurement processes, and to serve customers across national boundaries and functional lines. It will also enable people to make quicker and more informed decisions, enhance internal controls, and reduce the costs for information system support.

The Olympic Project 1 team is creating what Mike Wirth, executive vice president for Global Downstream, calls the "enterprise culture." In short, they are working to globalize, standardize, and transform the way Downstream works.

Kirk Doberenz, technical systems manager for Project Olympic, brings his colleagues up to date on technical systems.

The energy is palpable on the second and fourth floors of our U.S. offices in Concord, California, where all this is happening.

The team – more than 300 people from around the world – have their minds intent upon a common purpose. In the process, the experience they gain will be invaluable in explaining the new business system when they return to work in their own parts of the world.

Since starting in October, says Steve Woodruff, the value realization manager for Project 1, the team is well on the way to building the single SAP system capable of realizing the project's business case. "Now we are engaging with the business to help manage the transformational technology change that these new processes and systems will bring," says Steve. "This is more than an information technology project; this is business re-engineering on an Olympian scale."

Jojo Sacdalan

The sentiment was echoed by Jojo Sacdalan, Asia Pacific Regional Business Integration Leader (RBIL), Global Lubricants: "This is not an IT (information technology) project but a business project. It's an exciting one because the final product will meet the business needs of the enterprise."

Vic Samuel

"The first stage is to get all countries onto a consistent single SAP design, using standard business processes and data. That will provide a single source of management information that can be used to drive business decisions from an enterprise perspective," says Vic Samuel, Europe RBIL, Lubricants.

Balancing the Business Case With the Technology

Edwin Yu

"There are 880 business differences involved in our work,"says Edwin Yu, North American RBIL, Global Marketing. "We have an SAP system in North America, and while the U.S. system is the baseline we build from, we share the universal challenge of letting go of constraints that inhibit a global system."

The complexities are considerable, and at end of February, Bev Martinez, finance process-design architect for Project Olympic, told the Olympic team that one of the most pressing is to manage monetary exchange rates to reflect a global perspective.

Claudia Pena

Claudia Pena, Latin America RBIL, Finance explains:“The major driver of the business case for Finance in Latin America is to obtain accurate reporting for segmented balance sheets to better monitor activities throughout all levels of our business: aviation, lubricants, retail, commercial and industrial.”

Bhavesh Chuahan

Adds Bhavesh Chauhan, functional BIL, Global Supply and Trading (GS&T): “For GS&T, Olympic will also be a key enabler for Project Lynx to deliver on their business case. Olympic will create the need for a huge change management effort in terms of people behaviors and processes.”

Karen Pascall

The group agrees that despite the challenges, the rewards of Olympic will be worth the effort given the outcomes as acknowledged by Karen Pascall, Latin America RBIL, HR: “At the end of this project, there will be a single trusted source of people data available for talent management, global reporting and strategic decision making across all business units. For Latin America, the SAP implementation will be a significant change, since the U.S. SAP does not exist in any of the 42 countries.”

Hugh Hutton

“The all-embracing global coverage of Olympic is going to greatly accelerate enhancements to Procurement operations and supplier management,” says Hugh Hutton, Africa RBIL, Procurement. “It’s a monumental task. The prize is a consolidated system. Our job is to facilitate regional implementation of this system and deliver the predetermined savings in the business.”

The common view of the Project Olympic team members is that in putting information to work, it’s not the technology that raises productivity but how it’s used. The business case is powerful. When it’s all said and done, overall the project is projected to deliver $41 million in one-time benefits and $230 million in recurring benefits.

VOICES

“How do you make a difference in your community?”

by Rachel F. Elson

Mabiola Howard

Administrative assistant,
Global Downstream,
Georgetown, Guyana

“I help with our contributions and donations program here, and we recently donated computers to the University of Guyana. The university was flooded in 2005, and the library’s books and computers were severely damaged. Our office has a lot of different community projects – we work with a school that we have adopted, and we have worked with the Guyanese police on road safety – but this was a special project. The university is very important in the development of Guyana; most of us who work here got our degrees there. So it was a way of giving back.”

Donna Bailey

Managing counsel,
Global Gas,
Houston, Texas

“I volunteer at a wildlife shelter here in Houston, where we take in wild animals that have been injured or displaced – possums, raccoons, squirrels, snakes, songbirds and other animals. We place them with licensed rehabilitators, care for the animals, give them medical attention if necessary, and then release them back into the wild. We also serve as an information source for the people of Houston to let them know how to share our environment with these animals. Community to me is broader than people; it’s about our relationship with our environment.”

Dale Abrahams

Controls engineer,
El Segundo Refinery,
El Segundo, California

"I've been working with a youth ministry for about 12 years, working with junior high students, trying to help young people develop a heart of service. With Chevron, there are continuous opportunities to do something in the community. For example, a few years ago the company organized a tree-planting program in the area between the refinery and the ocean – most employees volunteered with their families, but I brought the youth group. A lot of the kids I work with come from single-parent homes. Sometimes they need role models; sometimes they're just looking for someone who's going to pay attention to them."

Bree Goff

Development geologist,
Chevron International Exploration and Production,
Perth, Australia

"We have a schools information program. We go out into the local schools and talk about the energy industry and encourage kids to go into the sciences and engineering. It's something I'm quite passionate about, particularly with girls – since they're really underrepresented in the field, it's nice to show people they have options. Because the Gorgon Project is getting started, there's a lot of interest in the company. So if we can go into the community, explaining how things work, I think it will be valuable."

Albert Kwa

Products trader,
Global Supply and Trading,
Singapore

"I've been involved with the Rotary Club for 12 years, and I was president last year, when we raised $10,000 for students in need. I'm also the assistant secretary of a community club that provides a common space for people of different backgrounds – religious, cultural, ethnic – to come together for sports, classes, other things. I think everyone has the responsibility to make a difference. The secret is time management. Also, when I do a fundraising project now, I bring along my kids. I want to pass along the idea of volunteerism on to them."

LETTER FROM...

Malaria Fighters of Cabinda

Volunteers on Mission of Microscopes

Suzana Abreu

Communications and Media representative,
Cabinda Gulf Oil Co. Ltd,
Cabinda, Angola

You might call us malaria fighters. On a Sunday in February, a group of us from the Cabinda-based Chevron Volunteer Opportunities Program (CVOP) gave up a free afternoon for that cause. I'm the CVOP coordinator in Malongo – about 24 kilometers (15 miles) north of Cabinda Town – where our terminal has been supporting the company's operations since the 1960s.

Dear Colleagues,

First, we gathered to unpack six brand new microscopes. We then set off to deliver one to each of six health centers in the community.

Francisco Iombo, chief of planning at the provincial health department, told us that they had prioritized the centers strategically within the fighting-malaria program.

Malaria is a problem in Cabinda, a small territory of 7,283 square kilometers (about 2,812 sq. miles) in west central Africa with a population of about 300,000. Malaria is one of the causes cited by international health officials as responsible for a 25 percent mortality rate in Angola for children under five.

Adjacent to our coast north of Angola lie some of the world's richest oil fields. We produce about 700,000 barrels of crude oil each day, generating about 60 percent of the revenue that Angola receives from the petroleum industry.

Grateful hands accept a new microscope for a local health center from CABGOC's Lateef Olajide. Background right is Beatriz Macaia, in pink, and at left is Dr. Stephan Andius.

As members of CVOP, we are part of Cabinda Gulf Oil Co. Ltd. (CABGOC), and our objective is to share our skills and know-how with the local community. CVOP's goal is to continually

improve the quality of life in the communities we work and live in through organized volunteer efforts of our fellow employees, their families, CABGOC, contractors and other associates.

Paulino Macosso, Lateef Olajide and Dr. Stephan Andius pack boxes prior to delivery.

Our medical superintendent, Dr. Stephan Andius, says that CABGOC and the health department in Cabinda are working together in a number of programs, including the one for malaria, which is the most frequent pathology around the community. With this in mind, we delivered the microscopes and visited the health center labs as well. Terry O'Reilly, CVOP vice coordinator, says the microscopes will help the labs offer a better service to the community. Malaria should be considered a potential medical emergency and should be treated accordingly. Delay in diagnosis and treatment is a leading cause of death in malaria patients. Although malaria can be suspected based on the patient's symptoms and the physical findings at the examination, for a definitive diagnosis, laboratory tests must demonstrate the malaria parasites or their components.

Microscopes are key to identifying malaria parasites through the examination of a drop of the patient's blood, smeared on a microscope slide. Prior to examination, the specimen is stained to give the parasites a distinctive appearance. This technique remains the gold standard for laboratory confirmation of malaria. Besides helping prevent a patient's death, quick diagnosis and treatment helps prevent further spread of infection in the community.

Our arrival at each center was greeted by truly happy people whose smiles garlanded their faces.

Beatriz Macaia, Cabinda municipal health director, with a microscope donated by the CVOP team. In the background is a video cameraman.

Beatriz Macaia, Cabinda municipality health director, could not fully express her gratitude to us. “When I learned about the donation, I was so excited that I couldn’t even sleep right,” she said as she thanked us.

The medical department lab supervisor, Paulino Macosso, who was the project leader, says our donation was valued at approximately $18,000, including the supplies related to lab diagnosis, such as lancets, pipettes, staining solution, slides and more.

“A microscope is a key tool for a successful malaria diagnosis, and we took care of it,” says CABGOC environmental supervisor Lateef Olajide. “We indeed lightened (the beneficiaries’) burdens and path and also rekindled hopes to eradicate malaria in the community.”

Sincerely,

Our article “Keeping Critical Talent on Board” in Issue 6 attracted a good deal of interest from among letter writers. Some of their letters are published here, with responses from Human Resources as appropriate.

‘Taking issues seriously’

As a “boomer,” I appreciated the great article “Keeping Critical Talent on Board.” I have seen important information lost in the past when people retired or left the company, and I have seen critical tasks “fall through the cracks” because no one quite understood what was involved in the job. I’m heartened to read that we are taking these issues seriously. I am also happy to read that we are considering the cost of piling more and more administrative tasks onto the plates of already over-extended knowledge workers. I have worked with both Jeff Stemke and Cary Mrozowski, and we are lucky to have them on the case. We are also lucky to have Renee Silveira to write incisive articles like this one.

— SBirkner@chevron.com

‘Self-serve Web sites’

I read with interest “Keeping Critical Talent on Board” in the March edition of Line Rider. One section of the article mentioned taking some of the administrative task load off scientists. This got me thinking of all the time I have to spend with self-serve Web sites and related inefficient processes.

I don’t want to become an HR expert, a travel agent or a training specialist. I want to describe my problem or need to a live human who can figure out the best solution. That would give me more time to do the things I’m good at – what the company hired me for. I’m a computer scientist, and I wonder how customers would react if I told them, “I’m not allowed to fix your problem for you, but here’s a Web site that will help you figure out how to fix the problem yourself.”

— erij@chevron.com

Response from Jim Schultz, general manager of Human Resources for Technology and Services:
Eric, as you describe, self-service for certain administrative and fundamental technical duties can lower productivity and frustrate technical scientists who find less time to practice their trade, the value-adding aspects of their job. This was one of the findings of the Technology and Services Retention Study mentioned in the article.
Among the retention study initiatives under way is our energy technology company’s workload-adjustment effort. This is a deliberate effort to review administrative and fundamental technical

duties currently performed by technical staff and management and where to appropriately establish and hire for office and technical assistant positions. In addition, senior management is encouraging all organizations corporatewide to streamline and simplify in order to ensure we optimize the talents and contributions of all employees. As a result, several corporate service groups are undertaking mindful reviews of processes, including certain self-service opportunities, that affect employee productivity.

'How many dominoes are in the chain?'

Knowledge transfer is an issue not only when people leave the company but also when people move within the company. Too often, there is no turnover process between the person leaving and the one who is to take over. The expense of trying to learn without a turnover process in place has to be enormous; certainly it is highly inefficient and has a cascading effect. Each job change surely effects at least two people, but how many dominoes are actually in the chain?

— DLaxo@chevron.com

Reply from Jeff Stemke, knowledge strategist:
Daryl, I can't hazard a guess on the magnitude, but you're right about the cost of knowledge lost and the drain on time and energy when a new person has to get up to speed without the benefit of a turnover process.
If a turnover process was being used regularly, it wouldn't matter how many employees were affected. Each person in the chain would have the advantage of the predecessor's experience. Right now, I believe the greater perceived need for knowledge transfer is to focus on soon-to-retire employees. In the case of a job transfer, the predecessor is still available (theoretically, anyway) to answer questions. But that isn't the case with retirees.
I'm piloting the use of a knowledge inventory worksheet to identify critical information that would be otherwise lost in the event of job turnover. The goal is to show that the turnover process can be short, can identify critical expertise and relationships that might be overlooked, and can help accelerate "time to performance" for someone in a new role. Success stories will support the business case to use a turnover process more consistently for job transfers and strategic staffing plans.

First-time reader

Please be informed that this is the first time I have received your great e-Magazine, which contains valuable information important for all of us. I just answered the five questions and submitted my entry.

— dossasf@chevron.com

Likes the quiz

I thank Line Rider for the thoughtful idea in giving employees the opportunity of participating in the "Test Your Knowledge" quiz. It gives us the opportunity to know about Line Rider. I would like to suggest more of this be done regularly.

— rigb@chevron.com