

## Norwest Expands Field Services

### Jackpine Mine - Opening Cut

by Nick Ponto

Over the last decade, Norwest has worked closely with Shell Canada in the long term development of their oil sands resources, specifically, the Albian Sands Expansion 1 project located at Jackpine Mine.

In addition to providing growth planning assistance to Shell, Norwest provided engineering services for the development of the mine opening cut being developed for the crushing and conveying system. The requirements also included the design of an ore stockpile to be used in commissioning the plant and a Waste Overburden Disposal Area. Upon completion of the design work, Shell sent the earthmoving contracts out for bid resulting in Noramac Ventures being awarded a contract to load, haul and dump the 10.4 million cubic metres of ore and waste material contained in the design.

Norwest provided oversight Field Engineers to ensure that the opening cut, commonly referred to as the crusher slot, was built to specification. In addition to that, Norwest's geology team modeled and mapped out different anomalies in the ore and waste by continuous sampling from the crusher pit as well as the ore stockpile. This will allow the operation to better blend material that will be taken from pre stockpile for commissioning.

The first activity in the field was to establish the road network connecting the crusher slot to the ore and waste dumps. Ledcor CMI spent much of August and September 2006 preparing the road network using material sourced from the

crusher slot and nearby borrow sources. In October 2006, upon completion of the roads, Noramac began the development of the Crusher Slot Production quickly ramped up to an average of 65-70 thousand cubic metres per day.

Cold winter conditions created difficult digging situations and required constant ripping of the frozen material, placing significant strain on the equipment over the project life. Strategic planning by all parties was required to ensure that production was not compromised by the elements and most importantly that a safe working environment was maintained.

As the excavation proceeded to lower elevations, groundwater management became a significant issue. Diversion ditches established at the top of the McMurray formation were able to handle water from the overburden. Water releasing from the McMurray formation in the lower portion of the excavation necessitated on-going execution plans in order to maintain the required production.

At the end of April 2007, the project was deemed complete and made available for the next phase of development, which includes the mechanically stabilized earth



Opening cut at Jackpine Mine.

wall, crusher and conveyor installations.

Norwest would like to commend Noramac on their timely completion of this project and would like to thank Shell Canada for the opportunity to be involved in the project.

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## inside

Moving Forward at the Jackpine Mine > p2

Building of an Ice Bridge > p3

176 Miles of Heat, Hills and Fun > p3

Presidents' Column > p4

Oil Sands Drilling and Core Logging... > p4

Shawn Malbon 1948-2007 > p5

Norwest-Questa Courses > p5

From The Riddle Master > p5

Paddling off Haida Gwaii > p6

## Moving Forward at the Jackpine Mine

by Jake Maybach



Nick Ponto and Jake Maybach at Pond 2.

Located in the heart of the Athabasca oil sands, about 75 kilometres north of Fort McMurray, Alberta, lies the Jackpine Mine (JPM) which is being developed as part of Shell Canada's Athabasca Oil Sands Project (AOSP) Expansion 1.

Since May 2005, Norwest has been providing Shell with mine planning services for this project developing designs for a site drainage network in order to prepare the JPM site for the final mine development work.

At the JPM, surface drainage is a critical first step in site preparation. Some of the site's 30 square kilometres of area is covered with muskeg and water. In some places, the muskeg is as deep as 5 metres, making construction difficult until water is drained and muskeg removed.

During the first construction season at the JPM, Norwest developed plans for four large sedimentation ponds and over 29 kilometres of drainage ditches. In addition to the design work in 2006, Norwest also performed the construction oversight for the project between March and June 2006.

The construction season in 2007 was even busier than in 2006. Norwest designed and oversaw construction of even more drainage ditches than the previous year. Acting as Shell's eyes and ears on the site, Norwest's field engineers worked with Shell's construction

contractors to ensure that the drainage ditches were constructed properly and that Shell received a quality product.

After 18 months of continuous construction, the JPM is well on its way to completion and Norwest is eagerly looking forward to tackling the next challenge.

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## Building an Ice Bridge to the Oil Sands

by Eric and Tom Becker

Norwest Corporation built an ice bridge over the Athabasca River to support exploration programs by clients Value Creation Inc., UTS Energy Corp. and Western Oil Sands Inc. This bridge provided access to oil sands targets within the Athabasca Oil Sands area of Northeastern Alberta. The ice bridge was located 90 kilometres north of Fort McMurray and provided access for exploration programs conducted by our clients, as well as, Shell Canada Ltd., Total E&P Canada Ltd., and Canadian Natural Resources Ltd. The ice bridge was also used as part of the logging operations of Northlands Forest Products Ltd., to support local trappers, and by the general public for recreational activities.

Construction of the 1.2 kilometres long by 20 metres wide ice bridge started during the last week of November, 2006 at which time the ice was approximately 150 millimetres thick. A minimum of 60 millimetres thickness is required to support an average person; 210 millimetres to support an average 4x4 pickup truck; and 1.44 metres to support

### Ice Strength For Continuous Travel

*This table is for clear, blue ice on lakes and on rivers. This table does not apply for parked loads, or where ice faults are evident.*

Permissible load (clear, blue ice)	Effective Ice Thickness in Millimetres	
	Lake	River
One person on foot	50	60
Group, in single file	80	90
Passenger car 2000 kilograms	180	210
Light truck 2500 kilograms	200	230
Medium truck 3500 kilograms	260	300
Heavy truck 7000 to 8000 kilograms	350	410
10,000 kilograms	380	440
25,000 kilograms	630	730
45,000 kilograms	800	920
70,000 kilograms	1000	1150
110,000	1250	1440

*This table is intended to provide general guidance only.*

a Caterpillar D-11 (110,000 kilograms). Starting on the east side of the river construction, crews drilled auger holes through the ice and pumped river water onto the overlying snow and ice. Over a 24 hour period 25 millimetres of ice can be added, if the outside temperatures are low enough (below -15°C). Once a safe thickness of ice was reached the crew utilized a Snow-CAT to make snow barriers along the edges of the ice bridge, thereby creating a dam to contain the water used to flood the surface. The Snow-CAT was also used to build the approaches on either side of the bridge.

Ground penetrating radar and sag tests were conducted in early January 2007. The bridge was opened to general traffic on January 12, 2007. At which time the ice was touching the river bottom for about half its width and reached a maximum thickness of 1.3 metres along a channel near the western bank. At this point the addition of 25 millimetres of ice to the top of the bridge was done in parallel to the removal of 25 millimetres of ice off the bottom of the bridge, partly due to flow restrictions. The

## 176 Miles of Heat, Hills and Fun

Norwest's relay team, Miners Not Whiners, finished in 4th place in the Wasatch Back Relay Corporate Division, benefiting Operation Kids. The course took them up and down the Wasatch mountains. Twelve runners alternated legs of the course and finished in a mere 25 hours. Van captains share some of their memories below.

Helene - Van 1:

"300 teams (plus spectators) created chaos and major traffic jams. Fortunately, being engineers kept us organized and on schedule. The Norwest volunteers, families and colleagues made this a fantastic experience!"

"We rested under a shade tree, waiting to run in 95 degree heat. At noon we gathered to watch Matt lead off. It was hard to miss his argyle socks and bright yellow running outfit. Craig Hawe ran strong, then supported the rest of us handing out water and encouragement. Sean, a flatlander, adapted well to the heat and elevation by running strong and cooling off with a 'bag-o-blueberries' ice pack. Kirk's first leg, a 1,210

ft. gain, looked tough, but he ran hard saying "it's not that bad" to ease my guilt for assigning him this leg. Megan ran around videotaping the race to warm up for her steep downhill leg."

Greg - Van 2:

"At 1:00 AM, Van 2 began their night runs. Reminiscent of an underground mine, headlamps bobbed towards anxiously waiting friends. By the time the team reached the conclusion of their leg at 5:00 AM, a hot shower and another round of quick sleep was crucial."

"The jolt of strong coffee got the team ready for the final leg: the run up and over the mountain into Park City. Fran and Bob swept across the foothills, passing to Greg and James for the murderous climb to the ridgeline at 8% gradient. Doug sprinted across the ridge and down the steep, twisting mountain roads to hand off to Craig Acott, who proudly led the Norwesters across the finish line on Saturday around lunchtime. It was great fun, and we'd do it again in a minute!"



Top: Craig Acott (Calgary), Craig Hawe (SLC), Doug Moore (SLC), Bob Evans (SLC), Kirk Weber (SLC), Sean Ennis (Vancouver) Bottom: James Sorensen (SLC), Greg Gillian (SLC), Megan Frederick (SLC), Helene Wieting (Denver), Matt Kascak (Denver), Fran Amendola (SLC)

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### Building an Ice Bridge.....Cont'd from page 2



Flooding the ice bridge over the Athabasca River.

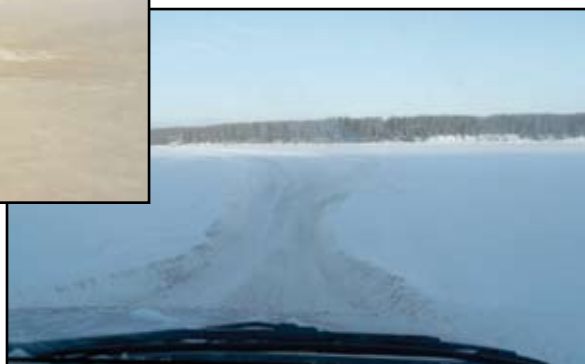
ice thickness was monitored weekly throughout the season. The last truck crossed the bridge on March 24, 2007.

The maximum speeds for crossing

the bridge were posted at 10 kilometre per hour, and only one vehicle was allowed on the bridge at a time. All traffic on access roads in the area is controlled using fully

monitored radio channels. Speeds and traffic usage on the bridge were monitored using the radio system.

Access routes on either side of the ice bridge are held under 'licenses of occupations' which are owned by Northlands Forest Products. Norwest, under an agreement with Northlands, built, maintained and supervised the use of the bridge. Norwest ensured that all necessary permits and/or approvals, as required under municipal, provincial or federal legislation, were obtained and complied with.



Entrance on to the completed ice bridge.

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# Presidents' Message

## Health & Safety

Norwest, as with most organizations, acknowledges our most important asset is our people. In fact since we do not own significant property, plant or equipment, ostensibly our only asset is our people. The key to protecting this asset lies in a comprehensive health and safety program that identifies and quantifies risks, implements preventive measures, monitors compliance and adjusts according to changing environments. Norwest has accepted and endorsed health and safety as a core value. We are committed to continually improving internal safety programs as well as assisting our clients in monitoring and developing their health and safety systems.

It is easy to think that, as professionals spending much of our time in a relatively safe office environment, we are immune to accidents and industrial disease. The truth is our employees are subject to a broad range of conditions, from crawling through underground mining operations to exploring in remote undeveloped muskeg. Geographically our employees

have worked in countries around the globe, from Argentina to Mongolia.

This issue of the Norwest highlights our field services activities. This area of business presents the greatest challenges to maintaining a safe work environment. The mobilization, transportation and utilization of people and equipment in remote areas requires a deliberate planned approach that considers the involved risks well in advance of performing the actual work.

Some of the key elements of our health and safety plan include:

- Active participation in industry-approved and externally audited Health and Safety Programs
- Weekly/Monthly safety meetings
- Tailgate safety meetings
- Formalized hazard assessment training
- SLAM risk assessments at work sites (Stop, Look, Analyze, Manage)
- ENFORM training (Canada)
- OSHA and MSHA training (US)
- Partners in Injury Reduction programs

(Alberta)

- Partnerships in Health and Safety (Alberta) COR certified
- Internal program audited by clients.

In 2006 Norwest employees and contractors worked a combined 490,000 man-hours with only one lost time injury to a contractor, who experienced two lost work days. This resulted in a combined Lost Time Incident Rate (LTIR) of 0.41. Through the 1st half of 2007 our employees and contractors have worked nearly 300,000 man-hours and have experienced no lost time injuries. This has resulted in a combined LTIR of 0.00.

Join us in applauding our employees, contractors and clients for a job well done as we redouble our efforts and commitment to complete 2007 and beyond without incident.

Bob Evans, President, Norwest Corporation, USA  
 Donovan Symonds, Chairman, Norwest Corporation  
 John Wright, President, Norwest-Questa Engineering, USA  
 Mike Day, President, Norwest-Applied Hydrology, USA  
 Joe Aiello, President, Norwest Corporation, Canada

## Oilsands Drilling and Core Logging

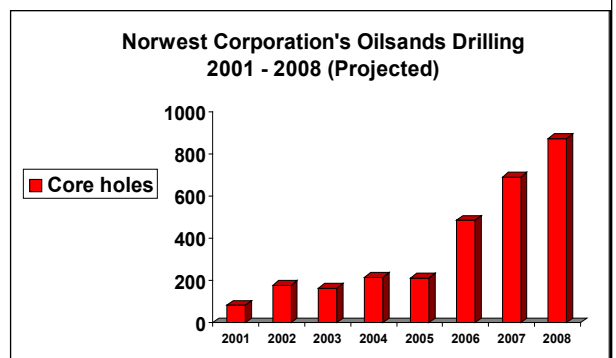
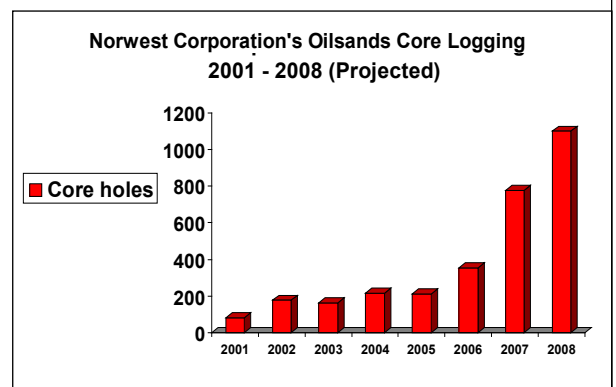
by Sue Carr and Ian Perry

The Field Services and Core Analysis groups have been steadily growing over the past seven years. Currently these groups provide project management and core description services to approximately fifteen oil sands clients involved in exploration as well as mining and in-situ projects in Alberta. These groups have also been involved in numerous coal, oil shale and gas projects in the United States, China and Europe.

Geological and geotechnical core logging is completed by up to fifteen geological specialists and technicians at laboratories in Calgary and Fort McMurray. The core logging process has evolved over the years from handwritten descriptions to specialized core logging software which can integrate photographs and analyses.

The upcoming season will be our busiest to date, with drilling expected to run from September to March and core description work expected to extend into July, 2008.

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## Shawn Malbon 1948 - 2007



I am saddened to report the death of Shawn Malbon. Shawn fought a brave and long battle with cancer.

I first met Shawn when he was a teenage apprentice at Birtley Engineering in Chesterfield, UK and I was completing my graduate work. Both of us were working in coal processing. We went our separate ways but eventually met up again at Norwest in 1994, where he remained for the next ten years. He met his wife Sandra at Norwest.

Throughout his career he had been intimately involved in the flowsheet design and start-up of over fifty preparation plants around the world. I had the honor to work with him and learn from him for many years. We have lost a very talented coal preparation engineer and an admired colleague. He was liked by all those who worked with him and knew him. We will remember his love of the Detroit Red Wings and football (the English variety) and his distain for green vegetables. He leaves a legacy of good memories and preparation plants which operate much better thanks to his quiet, meticulous efforts. Our sympathies go out to the biggest loves of his life: Sandra and his children James, Richard and Kai.

Donovan Symonds, Chairman, Salt Lake City, UT  
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### Element Percentage

This fictitious compound is primarily made up of the following elements. Two large components, however, have been omitted: what percentage does the compound have of gold and silver?

Al = 22%; Sn = 10%; Pt = 8%  
Fe = 2%; Au = ?; Ag = ?

**Be one of the next five lucky winners:**

*Five winners will be drawn from all those with correct responses submitted to Theresa Murphy by February 28, 2008.*



### "Strange Signpost"

420. Each vowel is given a value of 30 and each consonant a value of 60.

**The winners from last issue's riddle were:**

*What is going on? Not a single winner for the last riddle! Does the Riddle Master now reign supreme? We hope not!*

## Norwest-Questa Courses

### COALBED METHANE

#### An Overview of CBM Essentials

November 2, 2007, 8:00am-5:00pm  
Golden, Colorado US

This one-day course is valuable for managers, investors, engineers, geologists and technicians wanting an overview of CBM essentials without concentrating in any one area. The course presents the essential aspects of CBM, differences from conventional gas, its history and insight into its future.

Instructor: Joe McHenry, M.S.

### AUSTRALIA

#### Coalseam Methane - The Operations of Making a Coalseam Gas Project Happen

November 19-20, 2007, 8:00am-5:00pm  
Brisbane, Australia

#### CSM Production and Project Development

This course discusses the production characteristics and surface facility needs and then examines how all of the CSM components come together in a testing and development plan. Engineers, geologists, landmen, support personnel, and managers who need a working knowledge of CSM projects will find this course valuable.

#### CSM Drilling and Completions

This course discusses how to drill and complete CSM wells. Guidelines and costs are presented. The course is valuable for drilling, production and completion engineers, geologists, reservoir engineers, and managers who need a working knowledge of installing CSM wells.

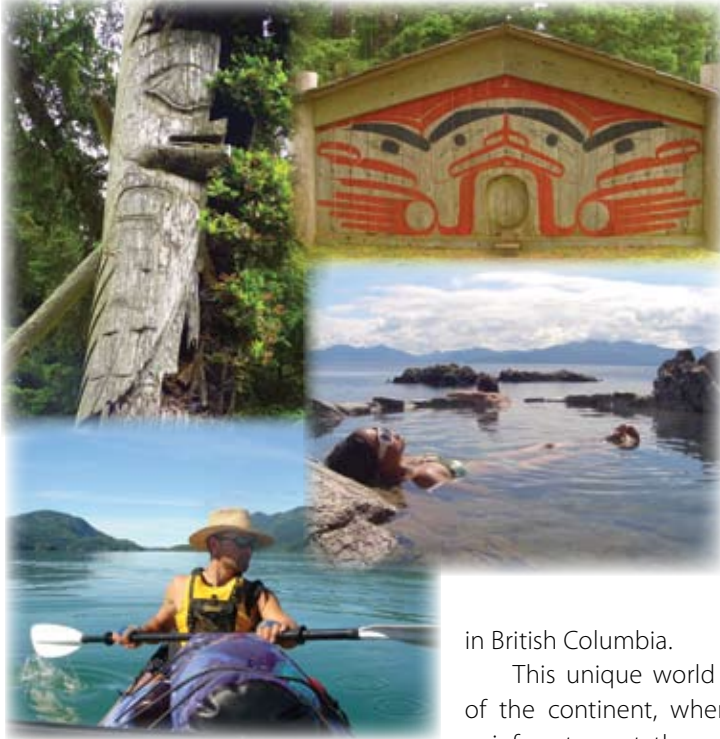
In conjunction with and sponsored by the Society of Petroleum Engineers (Queensland Branch) & Australian Journal of Mining.

Instructor: Steve Hennings, M.S., Scott Thomson, M.S.

For further details, email  
[questa@norwestcorp.com](mailto:questa@norwestcorp.com) OR 303 277 1629.

## Paddling into the Ripples of Time off Haida Gwaii

by Gordon Daniel



From Top left clockwise: An ancient totem pole and decorative longhouse pay silent tribute to the Haida's artistry. Soaking in one of several hot mineral water pools on Hotspring Island and, kayaking bliss.

There's nothing quite as peaceful or rewarding as sea kayaking along the west coast of British Columbia. Every year my family and I paddle from island to island, camp on the beaches and soak up that splendid serenity I just can't seem to find anywhere else. This year we planned a six-day, 100 km kayak expedition into Gwaii Haanas Park in the Queen Charlotte Islands

in British Columbia.

This unique world is perched on the edge of the continent, where mountains of ancient rainforest meet the wild and rugged coast of the Pacific Ocean. Some of the largest trees in the world are found in the moist, moss-carpeted forests and the diversity of life here is astounding.

Colorful starfish, sea urchins and shellfish dominate the intertidal areas.

Besides the incredible wildlife-viewing opportunities, we visited Gwaii Haanas to see the remains of the old Haida villages that used to prosper here. The islands are home to 10,000 years of Haida history and incredible stands of original totem poles and remains of massive longhouses pay silent tribute to their artistry.

On day five we reached our final destination: Hotspring Island. As we paddled towards the island we suddenly saw a burst of water shoot from the sea, accompanied by a hollow whoosh. Two humpback whales breached the surface just 100 metres from our kayaks! It was a special privilege to share the waters with these magical creatures.

The hot springs supply several pools of wonderfully hot mineral water to soak in. The rock pools sit right beside the ocean and the view is enchanting. A soothing day of soaking worked its magic on our weary muscles. The Haida once frequented these springs to heal and nourish body and soul. It's easy to see why.

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is a publication for the employees, clients and friends of Norwest Corporation.

Printed in Canada on Recycled and Recyclable Paper.

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