

## Oilsands Exploration - Dreams and Lasting Relationships

The world is looking toward the Athabasca oil sands of western Canada as a major source of petroleum, in a stable political environment. With estimates ranging from 1.7 trillion to 2.5 trillion barrels of oil, it is not difficult to understand why this relatively small area located in the middle of nowhere is one of the busiest places in the world. The City of Fort McMurray located in northern Alberta is home to some 60,000 people together with many thousands of construction workers, engineers, exploration geologists and drillers, to name but a few, and Norwest is heavily involved on all fronts.

To try and describe this world of frigid temperatures, short days, and isolation we had some of our Project Managers give us their impressions as this winter's field seasons draw to a close.

### Oil Sands Dream

**Don Matilla / Eric Becker / Rob Malony**

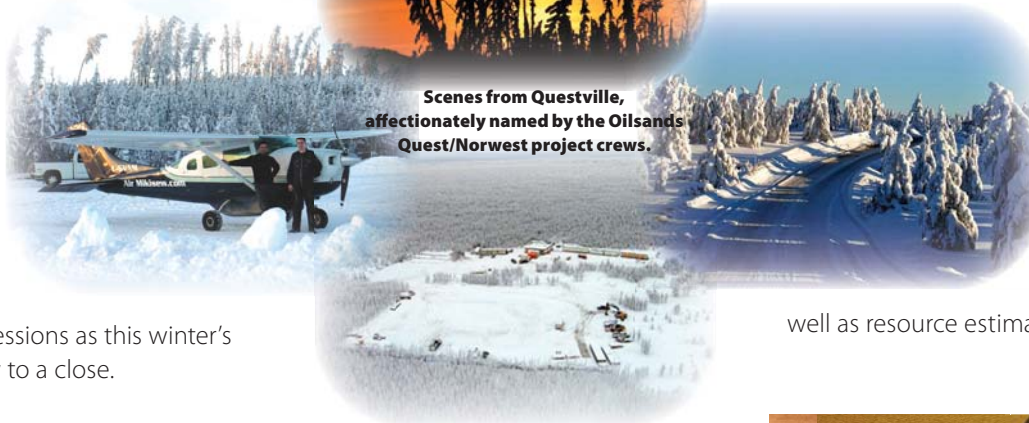
The Oilsands Quest project, Firebag East, in northwest Saskatchewan was initiated by a small group of entrepreneurs who wanted to test the hypothesis that the economic oil sand deposits in Alberta's Athabasca region stretched into the neighbouring province. Could there be oil sand on the other side of the border? Geologically it was a possibility. In late 2005, early drilling results confirmed that yes, there

is oil sand in Saskatchewan – the dream is to demonstrate the existence of commercially viable oil sands deposits in the area.

Oilsands Quest, supported by Norwest's geology team, launched an inaugural program to delineate a resource area which could significantly expand the



Scenes from Questville, affectionately named by the Oilsands Quest/Norwest project crews.



The results to date have been encouraging, and Oilsands Quest plans to expand its exploration efforts with a more extensive program next winter – one more step on the road to realizing a dream, and proving the existence of commercial oil sands deposits in Saskatchewan.

### On The Other Side Of The River

**Ian Perry**

In the spring of 2004, Norwest was retained by Value Creation Inc., a private Canadian company with a large land position in the Athabasca oil sands, to plan, and execute drilling programs, and produce geological models and

bitumen-in-place estimates on a number of their oil sands leases near Fort McMurray. While geological supervision and modeling, as

well as resource estimates are, and have

**cont'd on Page 3**

aerial extent of the Athabasca oil sands deposit. The objective of the program was to confirm earlier drilling information from the 1970s and upgrade the quality of the data using current analytical techniques. In addition to developing access to the property, setting up camp facilities and building roads to the drill sites, 24 drill holes were completed in Phase 1 of the program during the winter 2005/06 season.

## inside



Exceeding Expectations > p2

Questa Courses > p2

President's Message > p4

Mongolia's Mineral Frontier > p4

Metabolic Residue Collection Storage > p5

From the Riddle Master > p5

Sub for Santa Brings Smiles... > p6

# Exceeding Expectations

by Art O'Hayre



Remediation of Pit Wall Instability at Central Packwood Pit, Centralia Mine

The Norwest-Applied Hydrology merger was accomplished to form a hydrology and water resources engineering group within Norwest to help solve problems faced by the mining and energy resource industries. The combination is already exceeding expectations as hydrologists, hydrogeologists, and water engineers join geologists, mining engineers, geotechnical engineers, and petroleum engineers on a variety of projects. The projects have been quite diverse, ranging from a coalbed natural gas project in northwestern Colorado to a geotechnical stability and water management project in Indonesia. A project recently completed at the TransAlta Centralia Mine in Washington is particularly noteworthy. It required the integration of hydrology, geotechnical, and mine engineering and set a record time for completion and permit approval of the mine plan modification.

In fall 2004, TransAlta Centralia Mining LLC (TCM) experienced two separate instances of localized instability within the mining area referred to as the Central Packwood Pit. The first has been characterized as a creep type dump failure caused by placing waste material on what proved to be a weak foundation layer. The second has been characterized as a block type wall failure along a weak

"aqua putty" layer within the coal seam. Temporary mitigation measures were undertaken immediately to stabilize these areas, but the problems created significant hazards for continued mining. A creative and speedy modification to the mine plan was needed to allow mining to resume within this pit.

TCM directed Norwest to develop the conceptual plan for long-term remediation and to produce detailed mining and water management plans and permit applications. The team, consisting of mine engineering, geotechnical engineering, environmental management, and hydrology personnel, assembled in late December 2004. A conceptual plan for wall failure remediation and continued mining was developed. It required mining through two large sediment ponds located in series near the edge of the mine pit backfill to allow the pit wall angle to meet the stability requirements determined from the wall failure back analysis. After removing the weak aqua putty layer, a buttress of overburden material was placed so that the replacement ponds could be reconstructed on a stable backfill surface.

An interim water management plan was developed to allow the ponds to be temporarily removed from service during the seasonal dry period from April through October. The interim water management plan had to be capable of meeting or exceeding all discharge quality criteria. The remediation plan had to be completed over the course of one dry season so that the sediment ponds could be replaced and operational by the end of October.

Norwest completed the detailed engineering of the conceptual plan as required for permitting and construction, and permit applications were prepared, submitted, and approved. Removal of the ponds and mining of the coal and the associated weak aqua putty layer started on schedule in late April. However, the mining and buttress construction took a little longer than expected and the replacement ponds were not completed until January 2006. Nevertheless, the interim water management functioned effectively to keep operations going in December and early January despite near record rainfalls.

► Contact Art O'Hayre, Sr. Hydrogeologist  
Norwest-Applied Hydrology, Denver  
Tel: 303-782-0164 or aohayre@norwestcorp.com

## Questa Courses

### The Influence of Geology on Coalbed Methane Plays

April 28, 2006, 8:00am - 5:00pm - US\$525  
Golden, CO - Questa Office

### Oil Field 101™

April 11-12, 2006, 8:00am-5:00pm - US\$525  
Golden, CO - Golden Hotel

### Coalbed Methane

April 20-21, 2006, 8:00am-5:00pm - US\$725  
Calgary, AB - Telus Convention Centre

### Coalbed Methane Completions & Development

April 24-25, 2006, 8:00am-5:00pm - US\$725  
Calgary, AB - Telus Convention Centre

### Coalbed Methane Reservoir Simulation

May 18-19, 2006, 8:00am-5:00pm - US\$725  
Golden, CO - Questa Office

### Enhanced Oil Recovery Thermal Methods

April 20-21, 2006, 8:00am-5:00pm - US\$795  
Golden, CO - Questa Office  
May 15-16, 2006, 8:00am-5:00pm - US\$795  
Calgary, AB - Telus Convention Centre

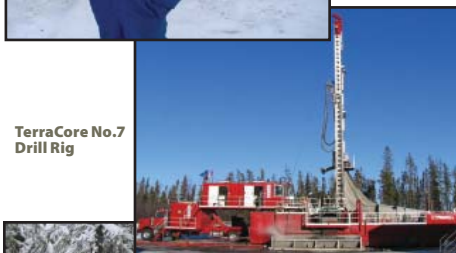
For further details, email [questa@questa.com](mailto:questa@questa.com) or call 303 277 1629.

**cont'd from Page 1**

been, core strengths of Norwest, the early stage planning and permitting, and field supervision of large scale construction and drilling programs, required the formation of strategic alliances



**Ian Perry,**  
Norwest's  
Project  
Manager



**TerraCore No.7**  
Drill Rig



**From Left:**  
Cornelius  
Waldner of  
World Wide  
Consultants;  
Melissa  
Robertson, EMS;  
Tom Becker,  
Norwest.



**Cora Lynn Rig**  
No.7 Crew.

**From Top**  
Left: Shane  
Preston; Steve  
McClay; Chris  
Degogue, Brad  
Nykeilchuk

between the company and a number of key contractors in the land services, surveying, and drilling and construction supervision fields.

The success of that 72-well program in 2004, led into a much larger program in 2005/06, in which 171 wells, ranging from 50m to 650m in depth were completed for two clients, Value Creation Inc, and UTS Energy Corp. At its peak the program utilized eight drill rigs, and over 30 pieces of construction equipment, as well as a complement of 130 people ranging from camp attendants to wireline, cementing, geological, drilling, construction, trucking, and medical/safety personnel.

The programs were carried out in a very busy part of the world, with concurrent, major drill programs

on neighbouring leases, and forest companies, Northlands and ALPAC cutting and hauling logs in the same area. In order to carry out the work safely, this level of activity required close communication between the various users, including radio controlled roads, and joint safety meetings. Ultimately the programs were completed in compliance with all of the regulatory requirements, and with no lost time injuries in over 160,000 man hours of frontline drilling and construction work.

The key to the success of the programs, in what turned out to be one of the warmest and shortest winters in recent years, was the dedication of the group assembled for the task. Special mention should be made of the field management and drilling expertise of the World Wide Consulting group, the road and lease construction expertise of the Wade Construction group, as well as Boreal Land Services and Eclipse Geomatics, all of whom were involved with the project from inception to completion.

## Lasting Relationships

**Eric Swanbergson / Michelle Surette**

Norwest Corporation has been contracted to Synenco Energy Inc. since December 2000 to assist them with their assessment of their Northern Lights Project, 100 km north of Fort McMurray, Alberta. During that time, Norwest

**Norwest's team:**  
L to R: James  
Zhang, Simon  
Raven, Michelle  
Surette, Rachael  
McMullen and  
Joe Aiello.



has been involved in the planning and completion of six winter drill programs. Geological crews have varied in size from 10 to 22 and team members generally work a three week on and one week off rotation.

With the field drill program complete, work will now shift to the processing, analyzing and interpreting all of the newly

acquired data. This phase of the project, along with the modeling and report generation requires more effort each year as the project database continues to grow. At some point during the summer, work will start on defining the objectives for the 2007 drill season and a new cycle will begin.

## Water, cool clear water

**Jim Thomson / Sara McCartney / Rick Reinke**

Norwest-Applied Hydrology recently conducted a hydrogeological investigation for a water supply and mine dewatering project at the Shell Canada Ltd. Jackpine Expansion site north of Ft. McMurray. The primary objective was to determine if an aerially limited shallow aquifer would supply sufficient potable

**Right: Rick Reinke**  
attending water well  
drill rig.



**Bottom:**  
Downhole pump with  
surface flow meter.



water for one to two years at a new mine camp. The secondary objective was dewatering the

muskeg overburden at the mine site. It was both a challenging and successful project; where water only a few degrees above freezing actually produced steam in the frigid conditions.

Two water supply wells and four monitoring and potential water supply wells were installed. A series of three-day pumping tests were conducted on the supply wells to determine the aquifer hydraulics and whether the aquifer met drinking water standards. Initial test results indicate that the two supply wells should provide a sufficient quantity and quality of water to meet the needs of the camp in 2006; but additional wells may be required in 2007.

# President's Message

## Meeting the Demand

Norwest Corporation has long been a major contributor in oil sand development in Canada, where it has been providing resource evaluation, geological characterization, and mine planning for many years. Norwest has expanded its offerings in the oil sands arena to include hydrologic support such as pre-mine dewatering design, mine water management, construction oversight, potable water source evaluation, groundwater modeling, permitting, and Environmental Impact Assessment-related work, utilizing the expertise of the Norwest Applied Hydrology professionals. In addition, we are actively evaluating Steam Assisted Gravity Drainage (SAGD) projects for several companies from both our Calgary and Golden offices utilizing the reservoir engineering services being offered through Norwest-Questa Engineering.

To meet the demands of the oil and gas sector, Norwest is expanding the expertise in its Calgary office with the addition of a reservoir engineering staff. One petroleum engineer is already

in place and a minimum of four more are anticipated to be established in the Calgary office by the end of the year.

In addition to expanding its services in oil sands, Norwest is also leveraging its vast expertise in the coalbed methane (CBM) industry to burgeoning CBM markets, not just in North America, but worldwide. We are currently undertaking a field study to develop initial data for a major CBM project in China, which will lead to engineering assessments and field engineering plans over the next several years. Norwest has also recently been retained on a CBM project in Europe that will involve drilling and testing wells to assess the viability of CBM development along with providing preliminary analyses and field development plans. The petroleum engineering arm of the company continues to be very active in CBM, with engineering projects in almost all of the CBM basins in the United States, and working in Australia on coal mine methane, which has many of the same technical issues as coalbed methane.

Our enhanced oil recovery and mature fields focus areas continue to be very active. Our environmental and hydrological groups are able to offer environmental evaluations and permitting services to augment the petroleum engineering services that Questa has always provided.

Additionally, we have extensive geologic mapping capabilities with earth-modeling capabilities including geostatistical modeling developed for the mining industry, which are directly applicable to the upstream petroleum industry..

Even in today's tight job market we continue to hire and retain excellent engineers and geologists to support our upstream activities. With the companies combined, we now can truly offer support in both conventional and unconventional resources from exploration to production. Norwest is locating and opening offices in areas to support our clientele, including a recent relocation to Charleston, West Virginia, and an office under consideration in Grand Junction, Colorado, to serve the western Colorado energy industry, including oil and gas, mining and oil shale.

As the oil industry continues to expand and grow, Norwest will be there with the expertise and experience to increase the value of our client's assets.

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

## Mongolia's Mineral Frontier



Exploration Drilling Camp, South Gobi Desert, Mongolia

Mongolia, a land-locked country known for its rich history and sweeping landscapes, is becoming an epicenter of mineral exploration activity. Few regions of the world contain the potential for both coal resource and metallic mineral development as the

deserts and steppes of Mongolia. These opportunities have attracted the attention of several major international mining companies interested in the mineral wealth of this country.

Norwest has been at the forefront of this exploration boom. Our initial engagement in Mongolia took the form of a pre-feasibility study of the world-class Tavan Tolgoi coal deposit for the Ministry of Infrastructure and Development. Since completion of the Tavan Tolgoi study in the mid-1990s Norwest geologists have examined virtually every major coal deposit in Mongolia. Additionally, our engineers have worked with the major coal

mine operators in improving their performance and transitioning to a free market environment. The summer of 2006 shows no signs of a slow-down as we prepare for the upcoming drilling season in the South Gobi Desert. With temperature extremes of from -40°C to well over 43°C and the nearest major population center over 1,000 km distant, Norwest exploration professionals continue to prove their mettle in one of the most beautiful and remote corners of the world!

Kirk Weber, V.P. & General Manager  
Norwest Corporation, Salt Lake City  
801-539-0044 or kweber@norwestcorp.com

## Metabolic Residue Collection Storage Facility



Eric Becker, a contractor for Norwest has put his ingenuity to work and found a practical use for old core boxes. Not a bad idea considering its quite serviceable, and with plenty of shelves for storage.

# from the riddle master

## Light the Fuse!

Tim has been working on the blasting crew for quite a while and has a few tricks up his sleeve. Stemming holes by hand has given him a lot of time to think. He has challenged the blaster Rosie to solve this little dilemma. He has two lengths of fuse, each of which will burn for exactly one hour. But the fuses are not identical and do not burn at a constant rate; there are fast burning sections and slow burning sections. How can Rosie time forty five minutes using only the two fuses and a lighter?

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

Five winners will be drawn from all those with correct responses submitted to Theresa Murphy by August 31, 2006.

## last issue's riddle solution

### "Gold on the Island"

Steve's successful proposal for dividing the one hundred coins is as follows:

- Steve gets 98 coins, Sue gets none, Sean gets one, Don gets none and Mary Lou gets one.

How does Steve get away with being so greedy? If only one consultant, Mary Lou, the junior person on the island,

remains on the island, obviously she will get all one hundred coins.

If the two junior consultants, Don and Mary Lou are left, Don (being more senior) will propose a method of sharing the coins that at least half the consultants will support. In this case, Don only needs his own support for a winning proposal, so he will propose to give himself one hundred coins, and none to Mary Lou.

But if three consultants (Sean, Don and Mary Lou) are on the island, the remaining senior one will require two votes out of the three to be successful. Obviously, Don will not be better off

### The previous winners from last issue's riddle were:

Roger Steen, Golden, CO, USA;  
Luc Savoie, Calgary, AB, CANADA;

Congratulations to all the participants and winners who demonstrated their abilities in problem solving and having fun with last issue's "monthly riddle." A job well done!

with Sean making the proposal, so he will vote against whatever Sean proposes. Sean has to make his proposal more favorable for Mary Lou to get her vote – and she got no coins under the two-consultant scenario, so Sean offers her one gold coin and he keeps the other ninety-nine.

With four consultants on the island (Sue, Sean, Don and Mary Lou), Sue needs two votes in favor of her proposal to succeed. She needs to make someone better off under her scenario than they would be under the three-consultant situation. The only person she can work with is Don, so she proposes to give Don one gold coin and keep the remaining ninety-nine for herself.

Steve uses the same logic to develop his proposed split – he will improve the lot of Sean and Mary Lou (the losers with no coins when there are four consultants) by giving them each one coin and keeping the rest for himself.

## "Sub for Santa" Brings Smiles to Kid's Faces

by Kira Thomas

This past December, the Salt Lake City office organized a "Sub for Santa" for two Somalian refugee families that had recently arrived in the U.S. Working with a volunteer coordinator at Mountain View Elementary School in Salt Lake City Utah, Norwest chose the Mberna family and the Hussein family. The Mberna family included a Grandmother, a young mother, and four children ranging from 4 to 11 years in age. The Hussein family included another young mother, and six children ranging from 1 to 12 years in age.

These two families were just a few of the nearly 45,000 Somalian refugees to be admitted to the U.S. since 1980. Both families are Bantu (a tribal distinction) and speak Maay Maay. The children spoke a small amount of English and adults spoke almost no English. Both families had been in refugee camps for over 10 years and were admitted to the U.S. for permanent resettlement because of the constant civil strife in Somalia. Once in the U.S., the families are given an apartment, cash and medical assistance for 18 months, employment preparation, job placement, English language skills and education for the children. What these families lack, however, are basic living necessities.

All the Salt Lake City employees donated to the Sub for Santa drive, either by buying the needed items themselves or by donating money. Each member of the two families was given a large gift bag full of new clothes, a warm coat, a blanket and at least one new toy. The families also received laundry baskets full of basic necessities: dishes, silverware, cleaning supplies, pans, cooking utensils,



Donovan Symonds, Kira Thomas, Zahra Hussein, and Kathy Symonds.



Donovan Symonds, Conrad Houser, and Kira Thomas with the Mberna Family.

laundry and dish soap, towels and pot holders.

Three Norwest employees, Donovan Symonds, Conrad Houser, and Kira Thomas, along with Donovan's wife Kathy visited the families just before Christmas to present the gifts. Our efforts were rewarded by big smiles on the children's faces and expressions of gratitude from the parents. This was truly a holiday experience to remember.

▶ Kira Thomas, Administrative Assistant  
Norwest Corporation, Salt Lake City  
Tel: 801-539-0044 or kthomas@norwestcorp.com

## for more information on:

**NORWEST**  
CORPORATION

### CANADA

#### Calgary, Alberta

Tel: 403 237 7763 Fax: 403 263 4086  
Email: calgary@norwestcorp.com

#### Vancouver, British Columbia, Canada

Tel: 604 602 8992 Fax: 604 602 8951  
Email: vancouver@norwestcorp.com

### USA

#### Salt Lake City

Tel: 801 539 0044 Fax: 801 539 0055  
Email: slc@norwestcorp.com

#### Denver, Colorado, USA

Applied Hydrology International  
Tel: 303 782 0164

Email: appliedhydrology@norwestcorp.com

#### Golden, Colorado, USA

Questa Engineering Corporation  
Tel: 303 277 1629 Fax: 303 277 0119

Email: questa@norwestcorp.com

#### Charleston, W. Virginia, USA

Tel: 304 414 4500 Fax: 304 414 4505  
Email: charleston@norwestcorp.com

#### Pittsburgh, Pennsylvania, USA

Tel: 724 255 9905 Fax: 724 225 9903  
Email: pittsburgh@norwestcorp.com

#### Houston, Texas, USA

Tel: 281 333 2241 Fax: 281 333 1192  
Email: houston@norwestcorp.com

#### Trinidad, Colorado, USA

Email: trinidad@norwestcorp.com

#### Yerington, Nevada, USA

Tel: 775 463 9388 Fax: 775 463 9488  
Email: yerington@norwestcorp.com

#### Gillette, Wyoming, USA

Tel: 307 685 3044 Fax: 307 686 0880  
Email: gillette@norwestcorp.com

### INTERNATIONAL

#### Beijing, China

Tel: +86 10 6466 4848 Fax: +86 10 6466 7489  
Email: guojiuhong@norwestcorp.com.cn

#### Newcastle, NSW

Tel: +61 02 4975 5228 Fax: +61 02 4975 5220  
Email: australia@norwestcorp.com

#### Kolkata, India

Tel: 91 33 449 9550 Fax: 91 33 449 1494

**NORWESTER**

### EDITORS

#### Theresa Murphy

Tel: 403 237 7763

Email: tmurphy@norwestcorp.com

#### David Wright

Fax: 403 263 4086

Email: dwright@norwestcorp.com



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