



## Inside June Mining News



The June issue of North of 60 Mining News is inside this issue of Petroleum News

### Asian tiger prowling for oil prey; Newfoundland's good cop, bad cop

**CHINA'S INTEGRATED OIL GIANT** PetroChina is paying US\$2.5 billion to buy half the upstream assets of its parent China National Petroleum Corp. (CNPC).

The deal, covering reserves of 780 million barrels of oil equivalent in 11 countries, will allow Hong Kong and New York-listed PetroChina to extend its reach from aging offshore Chinese oilfields and embark on a drive to bulk up on foreign assets and help satisfy rising domestic demand.

It comes as China has set up a special office to "tap overseas oil and gas reserves" to meet an expected 100 percent growth in internal energy consumption over the next 15 years.

That will put China's renowned bargaining skills to the test.



see INSIDER page 16

## BREAKING NEWS

**8 Spinnaker unveils 'significant' discovery:** U.S. Gulf ultra-deepwater gas find meets pre-drill reserve estimate of 100-125 bcf

**9 BLM begins plan for South NPR-A:** Issues EIS notice, calls for oil and gas leasing nominations, asks for mining interest

**12 Mackenzie rescue mission in full swing:** Imperial team leader credits government with 100% effort to resolve issues

## GULF OF MEXICO

# Jack-ups in jeopardy

Drillers warn more rigs to leave U.S. Gulf unless day rates move higher

By RAY TYSON

Petroleum News Houston Correspondent

The Gulf of Mexico likely will lose more shallow-water jack-up rigs to the Middle East and other aggressive international drilling markets, despite the U.S. Gulf's hot deep-seal natural gas play and rig day rates that are approaching historic highs.

It's also unlikely the U.S. Gulf will see any of the 30-plus announced new builds, many of which are expected to be absorbed by big national oil companies, such as Saudi Aramco, amid an ever-tightening jack-up market. (See sidebar about a jack-up for Alaska's Cook Inlet on page 15.)

"In short, the national oil companies have a far more ambitious agenda today than they ever did," said Bernard Duroc-Danner, chief executive officer of big oilfield services company Weatherford International.

see JACK-UPS page 15



COURTESY ROWAN

How high will day rates go for a premium, high-specification jack-up? "Well the answer to that is it's going to be a day rate greater than \$150,000 because that's what we think we can get in the North Sea." —Rowan chief executive Danny McNease

## CANADA/ALASKA

# Alaska gas key to survival

Petrochemical plants want liquids fed into Alberta, incentives to keep ethane in province

By GARY PARK

Petroleum News Canadian Correspondent

Faced with a severe shortage of ethane, Alberta petrochemical producers are on edge over the prospect that liquids-rich Alaska gas might be shipped on a bullet line through the province.

The future of a C\$12 billion industry that directly and indirectly employs 30,000 people in Alberta's industrial heartland hinges on the outcome of current efforts by gas producers, petrochemical companies and the Alberta government to find ways to correct an ethane shortfall, which now stands at 20,000 barrels per day.

**Dave Tulk, director of strategic development and feedstock at Nova, said that unless the governments provide early leadership, the North Slope producers may opt for a bullet line over an Alberta hub, regardless of the higher cost.**

Two solutions are at the top of a list proposed by industry leaders:

- Connecting a gas line from Alaska into the existing Alberta pipeline system.

see SURVIVAL page 14

## CANADA/ALASKA

# Today, tomorrow...whenever

Rumor mill has Enbridge boss on tenterhooks; expects federal government's decision 'very soon' on Alaska line; TransCanada chief not losing sleep

By GARY PARK

Petroleum News Canadian Correspondent

Enbridge CEO Patrick Daniel thinks the Canadian government will make a decision "very soon" on construction of the Alaska gas pipeline through Canada.

TransCanada's boss Hal Kvisle has "no particular expectation for this week ... or any week."

And the government itself is refusing to offer any hints.



Hal Kvisle, TransCanada



Patrick Daniel, Enbridge

Based on his reading of rumors rather than hard information, Daniel said June 13 he expects a "preliminary indication" from the government "of where they stand ... this week or next."

He said Ottawa has now had several months to ponder the alternatives and "should be in a position to make a decision."

But Kvisle believes his rival is overly optimistic that a ruling is at hand.

see WHENEVER page 12



# contents

Petroleum News

A weekly newspaper based in Anchorage, Alaska

## ON THE COVER

### Jack-ups in jeopardy

Drillers warn more rigs to leave U.S. Gulf unless day rates move higher; can get \$100,000 plus per day overseas — sidebar on Cook Inlet jack-up rig mobilization



### Alaska gas key to survival

Petrochemical plants want liquids fed into Alberta, incentives to keep ethane in province



### Today, tomorrow ...whenever

Rumor mill has Enbridge boss on tenterhooks; expects government decision "very soon;" TransCanada chief not losing sleep



## OIL PATCH INSIDER

- 1 Asian tiger on the prowl for oil prey
- 16 Newfoundland's good cop, bad cop
- 16 Cassandra still looking for investors for Katalla well



## EXPLORATION & PRODUCTION

- 4 Record well permits in Western Canada
- 4 Canada's rig count drops by 56, U.S. down by 14
- 7 Tiptoeing over the North Slope

CATCO's state-of-the-art vehicles expand the potential to move big loads over the tundra of Alaska's North Slope without leaving an imprint



### 10 Looking for North Slope coalbed methane

The Franklin Bluffs well will test for coalbed methane and will also pioneer the use of a lightweight rig on the Slope



### 8 Spinnaker unveils 'significant' discovery

U.S. Gulf ultra-deepwater gas find meets pre-drill reserve estimate of 100-125 bcf, will feed into Independence Hub



## FINANCE & ECONOMY

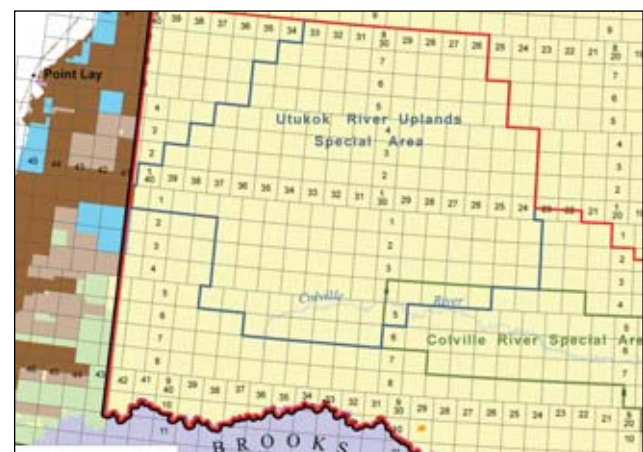
### 6 OPEC boosts output target, oil prices rise

Analysts call move purely symbolic, since cartel already exceeding higher quota; oil prices shoot up by \$1-plus per barrel after announcement

### 12 Energy exports headed for downturn

## LAND & LEASING

- 4 Bristol Shores applies for another Alaska exploration license
- 4 Dune buys Barnett Shale properties



### 9 BLM begins plan for South NPR-A

Agency issues EIS notice, calls for oil and gas leasing nominations in 9.2 million acre area, asks if any interest in mining

## NATURAL GAS

### 5 Not spooked, not panicked

Shell CEO not worried about LNG imports, doesn't buy talk that Mackenzie window could close by late July



### 12 Mackenzie rescue mission in full swing

Imperial team leader credits federal government with 100% commitment to resolve 'fundamentals;' movement on northern issues



## PIPELINES & DOWNSTREAM

- 8 TAPS to shut down for maintenance



# Alaska - Mackenzie Rig Report

Rig Owner/Rig Type      Rig No.      Rig Location/Activity      Operator or Status

## Alaska Rig Status

### North Slope - Onshore

<b>Doyon Drilling</b>			
Dreco 1250 UE	14 (SCR/TD)	Drilling, Milne Point, E pad MPE-31	BP
Sky Top Brewster NE-12	15 (SCR/TD)	Drilling, Kuparuk, well 1C-21	ConocoPhillips
Dreco 1000 UE	16 (SCR)	Workovers, J-Pad, well J-24-A	BP
Dreco D2000 UEBD	19 (SCR/TD)	Drilling, Alpine CD2-60	ConocoPhillips
OIME 2000	141 (SCR/TD)	Drilling, Kuparuk, 1E-105	ConocoPhillips

<b>Nabors Alaska Drilling</b>			
Trans-ocean rig	CDR-1 (CT)	Stacked, Prudhoe Bay	Available
Dreco 1000 UE	2-ES (SCR)	Prudhoe Bay, 06-20A	BP
Mid-Continent U36A	3-S	3H-14B	ConocoPhillips
Oilwell 700 E	4-ES (SCR)	Milne Point, MPF-38	BP
Dreco 1000 UE	7-ES (SCR/TD)	Prudhoe Bay, S-1111	BP
Dreco 1000 UE	9-ES (SCR/TD)	Niakuk Field, L-202	BP
Oilwell 2000 Hercules	14-E (SCR)	Stacked, Deadhorse	Available
Oilwell 2000 Hercules	16-E (SCR/TD)	Stacked, Prudhoe Bay	Available
Oilwell 2000	17-E (SCR/TD)	Stacked, Point McIntyre	Available
Emsco Electro-hoist -2	18-E (SCR)	Stacked, Deadhorse	Available
OIME 1000	19-E (SCR)	Stacked, Deadhorse	Available
Emsco Electro-hoist Varco TDS3	22-E (SCR/TD)	Stacked, Milne Point	Available
Emsco Electro-hoist	28-E (SCR)	Stacked, Deadhorse	Available
OIME 2000	245-E	Stacked, Kuparuk	Available
Emsco Electro-hoist Canrig 1050E	27-E (SCR/TD)	Stacked on 12-acre pad	Kerr-McGee

<b>Nordic Calista Services</b>			
Superior 700 UE	1 (SCR/CTD)	Drill site 18, well 12B	BP

### North Slope - Offshore

<b>Nabors Alaska Drilling</b>			
Oilwell 2000	33-E (SCR/TD)	Cold stacked on NorthStar Island	BP

<b>Nordic Calista Services</b>			
Superior 700 UE	2 (SCR/CTD)	Kuparuk, 10 well 27	BP
Ideco 900	3 (SCR/TD)	Stacked, Kuparuk 1Q pad	Kerr-McGee

### Cook Inlet Basin - Onshore

<b>Aurora Well Service</b>			
Franks 300 Srs. Explorer III	AWS 1	Rigging up to drill Moquawkie No. 3, should spud June 3	Aurora Gas

<b>Pioneer Natural Resources</b>			
Wilson Super 38	96-19	Stacked in Wasilla yard	Pioneer Natural Resources

<b>Kuukpik</b>			
	5	Stacked Kenai	Available

<b>Marathon Oil Co. (Inlet Drilling Alaska labor contractor)</b>			
Taylor	Glacier 1	KU24-7	Marathon

<b>Nabors Alaska Drilling</b>			
National 110 UE	160 (SCR)	Stacked, Kenai	Available
Continental Emsco E3000	273	Stacked, Kenai	Available
Franks	26	Swanson River, 314-04	Unocal
IDECO 2100 E	429E (SCR)	Stacked, removed from Osprey platform	Available

<b>Water Resources International</b>			
Ideco	H-35 KD	Stacking, Pre to MOB to Kenai	Pelican Hill

### Cook Inlet Basin - Offshore

<b>Cudd Pressure Control</b>			
	340K	Stacked	Available

**Unocal (Nabors Alaska Drilling labor contractor)**  
Not Available

<b>XTO Energy (Inlet Drilling Alaska labor contract)</b>			
National 1320	A	Idle	XTO
National 110	C (TD)	Idle	XTO

### Copper River Basin

<b>Nabors Alaska Drilling</b>			
Rigmasters 850	129	AHTNA 1-19	Rutter & Wilbanks

## Mackenzie Rig Status

### Mackenzie Delta-Onshore

<b>AKITA Equitak</b>			
Dreco 1250 UE	62 (SCR/TD)	Stacked, Tuktoyaktuk, NT	EnCana
Dreco 1250 UE	63 (SCR/TD)	Stacked, Lucas Point, NT	Chevron Texaco
National 370	64	Stacked, Inuvik, NT	Available

### Central Mackenzie Valley

<b>AKITA/SAHTU</b>			
Oilwell 500	51	Stacked, Norman Wells, NT	Available
RigMaster P-850	40	Moving out after drilling Sahcho L-71	Northrock Resources

<b>Nabors Canada</b>			
	62	Racked	Apache
	8	Stacked, Alberta	Apache

## Yukon Territories Rig Status

### Yukon

<b>AKITA/Kaska</b>			
National 80UE	58	Stacked, Fort Liard, NT	Available

<b>Ensign Resources Svc. Grp.</b>			
Jackknife Double	55	Drilling completed, racked in Ft. Nelson	Devon Canada

The Alaska - Mackenzie Rig Report as of June 2, 2005.  
Active drilling companies only listed.

TD = rigs equipped with top drive units WO = workover operations  
CT = coiled tubing operation SCR = electric rig

This rig report was prepared by Alan Bailey



JUDY PATRICK

### Baker Hughes North America rotary rig counts\*

	June 10	June 3	Year Ago
US	1,339	1,353	1,187
Canada	319	375	273
Gulf	92	94	95

### Highest/Lowest

US/Highest	4530	December 1981
US/Lowest	488	April 1999
Canada/Highest	558	January 2000
Canada/Lowest	29	April 1992

\*Issued by Baker Hughes since 1944

The Alaska - Mackenzie Rig Report is sponsored by:



## NORTH AMERICA

### Canada's rig count drops by 56, U.S. down by 14 rigs in weekly survey

The number of rotary drilling rigs operating in the United States and Canada during the week ending June 6 totaled 1,658, down a combined 70 rigs from the previous week but up a combined 198 rigs from the same period last year, according to rig monitor Baker Hughes. Canada's rig count stood at 319, a decrease of 56 compared to the previous week but an increase of 46 rigs compared to the year-ago period.

The number of drilling rigs operating in the United States decreased by 14 from the prior week to 1,339. However, the count was ahead of the year-ago period by 152 rigs. Compared to the prior week only, land rigs dropped by nine to 1,222. Offshore rigs decreased by four to 94 and inland water rigs slipped by one to 23.

Of the total number of rigs operating in the United States during the recent week, 1,196 were drilling for natural gas and 141 for oil, while two rigs were being used for miscellaneous purposes. Of the total, 847 were vertical wells, 324 directional wells and 168 horizontal wells.

Among the leading U.S. producing states, Texas' rig count plummeted by 16 versus the previous week to total 595 rigs. Oklahoma's rig count decreased by five to 149, while Colorado's slipped by one to 69 and Louisiana's slipped by one to 186. Wyoming picked up four rigs for a total of 71 rigs, and Alaska picked up one rig for a total of 10 rigs. New Mexico was unchanged with 77 rigs.

—RAY TYSON

## SOUTHWEST ALASKA

### Bristol Shores applies for another southwest Alaska exploration license

Bristol Shores LLC, a company owned by a group of Native elders from the Bristol Bay region, has applied again for an oil and gas exploration license in the Dillingham area. The company was granted a license last year but the license lapsed because Bristol Shores did not bond the exploration commitment within the required time period, Pat Galvin, petroleum land manager for the state of Alaska's Division of Oil and Gas, told Petroleum News June 14.

The new application is for a much reduced land area of 20,154 acres on the east side of Nushagak Bay, south of Dillingham. Last year's license covered about 329,000 acres, Bristol Shores president George Shade told Petroleum News.

Shade said Bristol Shores has investor funding for the new license but that his company is in dispute with the state regarding proof of funding.

Galvin said the division requires proof of funding ability from Bristol Shores before the division will go back through the best interest findings process for the license.

*Editor's note: Watch for full story next week.*

—ALAN BAILEY

## CANADA

### Record well permits in Western Canada

Western Canadian regulators issued record oil and gas well permits in the first five months of 2005, but flooding in southern Alberta this month could slow drilling activity. The four provinces approved 11,361 wells, a strong 4 percent ahead of last year's record 10,931.

Oil approvals surged by 19 percent to 2,509 with bitumen drilling in Alberta making a 64 percent gain to 656, but gas barely edged ahead of 2004's tally, with 7,959 permits, up just 13 permits, although coalbed methane raced from 360 licenses last year to 1,046 this year.

The top five companies were EnCana with 1,985 permits, Apache Canada 794, Canadian Natural Resources 696, Husky Energy 488 and EOG Resources Canada 434.

The wettest spring in a decade could slow the rate of approvals in June.

Parts of Alberta were already in decline before the rain intensified in the first week of June, with some rig counts off by 30 percent.

But the Canadian Association of Oilwell Drilling Contractors and Canadian Association of Petroleum Producers were unsure what impact flooding would have.

—GARY PARK

## HOUSTON, TEXAS

### Dune buys Barnett Shale properties

Houston-based Dune Energy has agreed to buy 95 percent of Voyager Partners' Barnett Shale oil and gas properties in North Texas for \$56 million, Dune said June 14. The deal is expected to close before June 30.

Dune estimates that there are in excess of 100 drilling locations on Voyager's Barnett Shale properties, based on current well spacing rules. The company said as many as one-third of the locations could be drilled horizontally.

A reserve report prepared by independent petroleum engineering firm DeGolyer & MacNaughten indicates there are net proved reserves of about 27 billion cubic feet of gas equivalent reserves underlying the properties, Dune said.

However, based on Dune's internal evaluation, the company now expects Voyager to add as much as an additional 18 bcf in proved reserves to the assets being acquired by Dune, bringing the total to 45 bcf. Under terms of the agreement, Voyager would retain a 5 percent working interest. Dune subsidiary Dune Operating Company would be operator of record. However, an affiliate of Voyager, which is presently operating the Barnett Shale properties, would operate for Dune on a contract basis after the closing.

In addition, Dune said it has entered into an agreement by which an undisclosed independent drilling company would provide Dune with two vertical drilling rigs for a period of at least one year, with future extensions by mutual agreement. Moreover, Dune said it expects the contract operator to provide a rig capable of horizontal drilling during the fourth quarter of 2005. Dune said it would try to secure additional third party rigs in order to step up its development drilling program.

—RAY TYSON

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<b>F. Jay Schempf</b>	CONTRIBUTING WRITER (HOUSTON)
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ADDRESS  
P.O. Box 231651  
Anchorage, AK 99523-1651

EDITORIAL  
Anchorage  
907.522.9469

Editorial Email  
Anchorage  
publisher@petroleumnews.com  
Canada  
famorth@petroleumnews.com

BOOKKEEPING & CIRCULATION  
907.522.9469  
Circulation Email  
circulation@petroleumnews.com

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*Petroleum News and its supplement, Petroleum Directory, are owned by Petroleum Newspapers of Alaska LLC. The newspaper is published weekly. Several of the individuals listed above work for independent companies that contract services to Petroleum Newspapers of Alaska LLC or are freelance writers.*

Petroleum News (ISSN 1544-3612) • Vol. 10, No. 25 • Week of June 19, 2005

Published weekly. Address: 5441 Old Seward, #3, Anchorage, AK 99518

(Please mail ALL correspondence to:

P.O. Box 231651, Anchorage, AK 99523-1651)

Subscription prices in U.S. — \$78.00 for 1 year, \$144.00 for 2 years, \$209.00 for 3 years.

Canada / Mexico — \$165.95 for 1 year, \$323.95 for 2 years, \$465.95 for 3 years.

Overseas (sent air mail) — \$200.00 for 1 year, \$380.00 for 2 years, \$545.95 for 3 years.

"Periodicals postage paid at Anchorage, AK 99502-9986."

POSTMASTER: Send address changes to Petroleum News, P.O. Box 231651 • Anchorage, AK 99523-1651.



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• C A N A D A

# Shell Canada CEO not spooked, not panicked

*Mather not worried about competition from LNG imports, doesn't buy talk that Mackenzie window could close by late July*

By GARY PARK

*Petroleum News Canadian Correspondent*

Shell Canada's boss is not about to join the ranks of those who fear liquefied natural gas projects in Canada will topple the Mackenzie Gas Project.

Neither is he about to set a "drop-dead" deadline for the C\$7 billion Arctic venture.

Chief executive officer Clive Mather left no doubt June 9 that Shell Canada is fully committed to standing behind its 11.2 percent interest in the Mackenzie consortium and, to that extent, doesn't agree with those who think the window of opportunity is about to close.

Neither is he losing sleep over the rapid progress on two LNG projects in Atlantic Canada – the joint Irving Oil-Repsol terminal in New Brunswick and Anadarko's Nova Scotia plant.



"We are using the summer to talk to key stakeholders. I hope that by the time we get through to the fall we can see a step change." —Shell Canada CEO Clive Mather

"I don't see LNG as a direct competitor to those northern gas fields," Mather told reporters after speaking

to the Calgary Chamber of Commerce.

"They're very different forms of energy supply ... the infrastructure requirements are different," he said.

## Others see LNG as threat to Arctic gas

In both respects, he is taking a higher road than Murray Smith, Alberta's former energy minister and now head of the province's trade office in Washington, D.C.

Smith has issued blunt warnings that unless the Mackenzie project gets back on track by the end of July it faces being shouldered aside by LNG imports or the Alaska gasline.

Christopher Theal, an analyst at Tristone Capital, shares the view that a major influx of LNG by the end of this decade increases the chances of the Mackenzie project being delayed "for a significant period of time."

## Hopes for step change by fall

Although less pessimistic, Mather does not absolve the Canadian government of the need to "unblock the (Mackenzie) regulatory processes, so we can actually get this thing started again."

"We are using the summer to talk to key stakeholders," he said. "I hope that by the time we get through to the fall we can see a step change."

With an 11.2 percent interest in the Mackenzie consortium and a 100 percent ownership of the 1 trillion cubic foot Niglintgak discovery, one of the Mackenzie's three anchor gas fields, Shell Canada regards the undertaking as a "very, very important project."

However, the consortium partners (Imperial Oil, ConocoPhillips Canada, ExxonMobil Canada, Shell Canada and the Aboriginal Pipeline Group) are not prepared to deal with aboriginal demands and lawsuits running to "hundreds of millions of dollars."

"We couldn't afford to carry on burning money the rate we were," Mather said, explaining why project execution activities were suspended in April.

The land and benefits claims made by First Nations along the pipeline route "fall legitimately to governments rather than to the economics of the project because if we overload the project the result is certain ... it won't stand up economically," he said.

## Encouraging signals

Although the pre-work has been halted, there have been some encouraging signals.

The federal government and other affected groups are now working with the Mackenzie partners to tackle unresolved issues.

The government has also assigned additional staff to the project and is "working with us to try and move this thing forward," Mather said.

For the second time this month, Smith told a Calgary audience June 7 that the Mackenzie pipeline is "not a slam dunk at this stage."

He said that if the project loses "impetus, compared to the speed (with which) the Alaska line could be built, I would fear that the (Mackenzie) pipeline would lie dormant for another generation."

Smith said U.S. gas markets will "wait for no-one ... they reward the first one and the best one there."

The Mackenzie project is "absolutely critical" to the North, Alberta and Canada and "I would hope that we could find regulatory solutions over the summer that would allow it to go ahead," he said.

## LNG projects gather pace in Canada

Whether or not they spell trouble for Arctic gas plans, two liquefied natural gas projects for Atlantic Canada are quickly moving beyond the pipe-dream stage.

A partnership of two privately-held companies – New Brunswick's Irving Oil and Spain's Repsol wrapped up a deal June 7 to build the Canaport terminal and regasification plant near Saint John, New Brunswick.

The C\$750 million facility is expected on stream in 2008, with a peak send-out target of 1 billion cubic feet per day.

To ensure the project goes ahead, the New Brunswick government has granted the partners a special property tax rate of C\$500,000 per year for 25 years – about one-tenth of what would normally be charged.

In neighboring Nova Scotia, Anadarko has the wheels in motion for a summer start on construction of its Bear Head project.

Gas should flow from the C\$650 million terminal at the rate of about 1 billion cubic feet per day in 2009.

In its effort to lock up that project, the Nova Scotia development agency sold 173 acres of government-owned industrial property for a modest C\$4.62 million.

Nova Scotia Premier John Hamm said Anadarko is spending heavily on engineering, "so for all that I can learn they're moving forward. I'm confident the commitment is there"

Anadarko said earlier this month that it is also in talks with Maritimes & Northeast Pipeline to secure most of the planned addi-

see SHELL page 6

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• VIENNA

# OPEC boosts output target, oil prices rise

Analysts call move purely symbolic, since cartel already exceeding higher quota; oil prices shoot up by \$1-plus after announcement

By EDITH BALAZS  
Associated Press Writer

**O**PEC agreed in mid-June to increase its production quota by half a million barrels a day, though the move was deemed inconsequential by analysts and oil prices shot up by more than \$1 a barrel.

The Organization of Petroleum Exporting Countries said its output ceiling will rise from 27.5 million barrels to 28 million as of July 1, and that it will consider another 500,000-barrel increase if prices don't fall.

Analysts called the move purely symbolic, since the cartel already is exceeding the higher quota, and said it didn't ease market fears of tightening fuel supplies later this year.

OPEC President Sheik Ahmed Fahd Al Ahmed Al Sabah insisted "there is enough supply in the market. We are confident we can reach the fourth quarter with enough supply."

If the market needs more crude, "Saudi Arabia, the United Arab Emirates and Kuwait can very easily provide the extra half million barrels a day," he said.

Other OPEC officials said oil prices are high and volatile because of limited refinery capacity around the globe and geopolitical tensions.

Crude prices have been hovering around \$55 per barrel, and the group was working to get them back below \$50. In the United States, retail gasoline prices average \$2.13 a gallon, up about 40 percent in the past two years, and demand is still on the rise.

The U.S. Department of Energy said June 15 that domestic gasoline demand over the past four weeks has averaged almost 9.5 million barrels per day, or 3 percent above year ago levels. The agency also said in its weekly petroleum supply snapshot that U.S. crude inventories fell by 1.8 million barrels to 329 million barrels, an unexpected drop that triggered buying on futures markets.

Light sweet crude for July delivery rose \$1.45 to \$56.45 a barrel in midday trade on the New York Mercantile Exchange. On the International Petroleum Exchange, July Brent was up 92 cents to \$54.65 a barrel.

"Today's OPEC meeting is a past story, really," said Peter Gignoux, an analyst with New York-based GDP Associates. "At the

**Kamel al Harami, an oil analyst from Kuwait, contended that OPEC is helpless to cool prices. "The situation is out of its hands," he said, predicting prices will remain at their current level.**

end of the day, we have a demand issue, not a supply one."

Global oil demand is expected by many analysts to average more than 84 million barrels a day in 2005, maintaining pressure on producers, whose spare output capacity is roughly 1.5 million barrels a day.

"It's unlikely this will have a major effect in the short-term, as we believe OPEC has limited capacity to increase production," added Daniel Hynes, an energy analyst with Australia's ANZ Bank.

Al Sabah said the group had little choice but to do something with prices already high and expected to climb, although he conceded that he didn't expect raising the quota to have an immediate effect.

The cartel also agreed on a new, larger oil basket — the combination of crude oils that OPEC uses as its price gauge — that would increase from seven types of crude to 11.

### Problem lies with refineries

Including Iraq, which is not bound by the quota, OPEC is churning out close to 30 million barrels a day, or about 35 percent of current global demand.

The group needs to increase supply at the end of July or early August to meet demand in the fourth quarter. He said OPEC would increase fourth-quarter output to between 30.5 million barrels a day and 31 million barrels a day.

With markets sufficiently supplied, the lack of spare refining capacity was a key factor driving soaring prices, OPEC said.

"We have to trace the root of the problem, and that is whether refineries can accommodate" further increases in oil production by processing lower-quality crude, Al Sabah said. "The main problem now is the refineries."

Kamel al Harami, an oil analyst from Kuwait, contended that OPEC is helpless to cool prices. "The situation is out of its hands," he said, predicting prices will remain at their current level. ●

continued from page 5

## SHELL

tion of 1.5 billion cubic feet per day to the M&NE pipeline from offshore Nova Scotia to New England.

The Houston-based company said as much as 85 percent of the 1 billion cubic feet per day of LNG it plans to import to Bear Head will end up in the United States.

If it turns into a struggle for survival between the two, some analysts give the edge to Irving-Repsol because of the Spanish company's plan to exclusively source the LNG from its operations in 25 countries.

Repsol is also eager to establish a base in Atlantic Canada because of the proximity to large markets in the U.S. Northeast.

Also moving ahead are plans to build a

C\$500 million LNG plant near Kitimat, British Columbia, by Kitimat LNG, an offshoot of privately-held Galveston Energy.

The plans are now being examined by B.C.'s environmental assessment office, which has started a 180-day review.

Kitimat president Rosemary Boulton told reporters that the economics of distributing 610 million cubic feet per day from the northern port are "making sense" if a supply contract can be reached with the Sakhalin Island project.

She said Alcan, Methanex and Eurocan could each become major customers, while pipeline networks open up access to British Columbia, Alberta, the U.S. Pacific Northwest and California.

Kitimat has secured C\$50 million in financing and hopes to start operations in 2008. ●



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# Tiptoeing over the North Slope

CATCO state-of-the-art vehicles expand explorers' ability to move big loads over the delicate tundra of Alaska's North Slope without leaving an imprint

By ALAN BAILEY  
Petroleum News Staff Writer

The migration of exploration and development activity into the National Petroleum Reserve-Alaska to the west of existing development on the North Slope demands some creative thinking into how to move heavy loads across the tundra many miles from the nearest road. And even although tundra transportation occurs during the winter season when snow and ice protect the delicate land surface, vehicles that can negotiate rough terrain while exerting little pressure on the ground surface provide critical support for off-road oil and gas operations.

Craig Tornnga, general manager of Crowley Marine Services in Anchorage, told Petroleum News in May about the latest design improvements in his company's massive CATCO all-terrain vehicles. Using innovative ideas through experience and new technologies, Bill Kuper, CATCO manager and his team, has designed a new electromotive CATCO vehicle to provide enhanced services to our customer. The company has a "patent pending" on the new power electromotive design.

## Airbags instead of tires

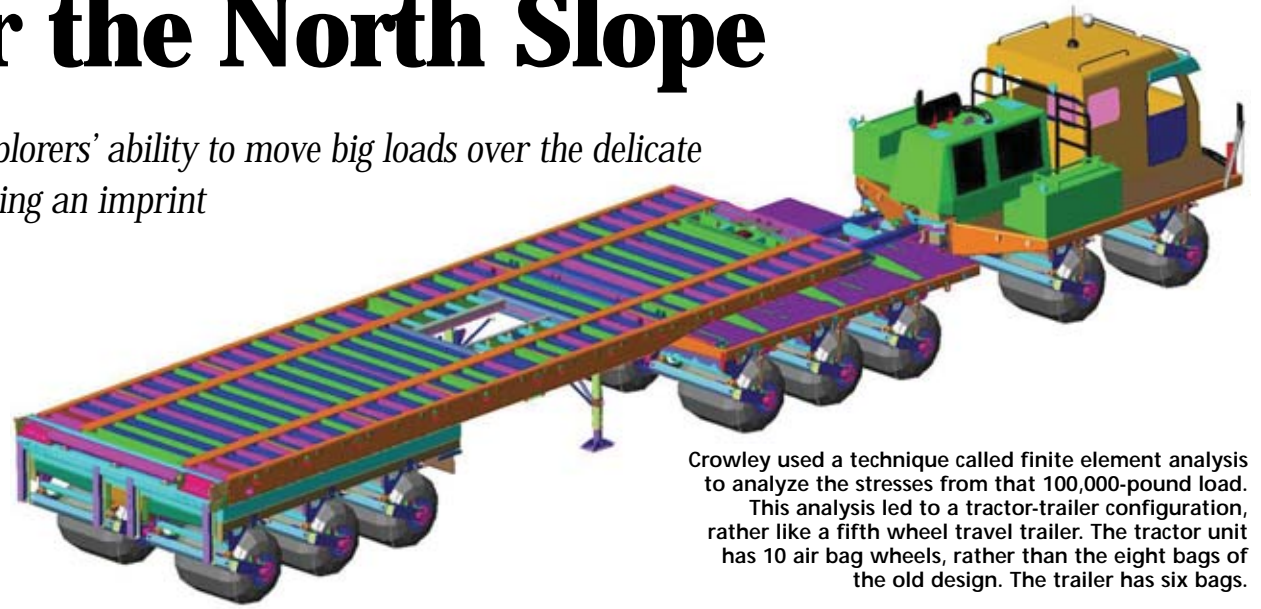
CATCO vehicles have been in use for a number of years and use eight airbag tires with huge circular airbags instead of tires. The airbag tires spread the vehicle's load across the ground, so that even when fully loaded the vehicle only exerts a pressure of 3 to 4 pounds per square inch on the ground surface, Tornnga said. An individual yoke arm holds each wheel independently, thus enabling the wheels to move up and down as the vehicle clambers over rough terrain like a giant caterpillar.

The old design used an individual mechanical transmission through a drive shaft for each pair of wheels, with friction rollers rather than wheel axles turning the individual airbag tires. The roller drive effectively eliminates skid damage to the ground surface — the roller will skid on the bag before the bag skids on the ground.

"You have your weight right on your bag ... so if you're trying to pull a good load, all bags are turning," Tornnga said. "Then if your friction is less than the friction between the ground (and the bag) ... your slippage is then between the roller and your bag, not between the bag and the ground."

## 100,000-pound capacity

A strategy to increase the CATCO carrying capacity from 60,000 pounds to 100,000 pounds triggered the latest design. Increasing the payload reduces the number of trips required to carry gear to a remote site, thus reducing the transportation costs.



Crowley used a technique called finite element analysis to analyze the stresses from that 100,000-pound load. This analysis led to a tractor-trailer configuration, rather like a fifth wheel travel trailer. The tractor unit has 10 air bag wheels, rather than the eight bags of the old design. The trailer has six bags.

"We're getting to 100,000 pounds so that we can reduce the cost per mile per ton for our customers," Tornnga said. The designers also tried to minimize the vehicle operating costs, Tornnga explained.

Crowley used a technique called finite element analysis to analyze the stresses from that 100,000-pound load. This analysis led to a tractor-trailer configuration, rather like a fifth wheel travel trailer. The tractor unit has 10 air bag wheels, rather than the eight bags of the old design. The trailer has six bags.

"The existing trailer that we have is a 40-foot trailer with four bags," Tornnga said. "So our new design is a 65-foot trailer with six bags to get to the 100,000 pound capacity."

## Electric drives

Having determined the basic design of the vehicles, the designers turned their attention to the drive system. The initial concept involved a conventional mechanical drive, as in the existing CATCO vehicles. But recent electric motor innovations made an electric drive system, rather like the powering of a diesel-electric railroad locomotive, possible.

"About 10 years ago we had looked at going to electric drive, but the motors were so large at that time and they weighed so much and they were so costly that it just wasn't feasible," Tornnga said. "We discovered that some of the new electric systems made it feasible to do," he said.

The roller that drives each air bag tire will now have its own electric motor with its own controller, powered by a diesel generator in the tractor unit. The motors and controllers are attached to a chassis-like center rail that extends the length of the vehicle.

By putting strain gauges on existing CATCO vehicles the engineers could determine the size of electric motor that the new vehicles would need. When doing this testing the engineers made the unexpected discovery that the mechanical load applied from the vehicle's engine did not apply uniformly to all of the wheels.

"We found that the mechanical system had peak loads to different drive rollers, and it wasn't evenly distributed," Tornnga said.

That discovery led to a significant advantage in the electric drive, in that the controller for each motor can adjust the power applied to an individual air bagged tire. Not only that — the torque applied to each drive roller can be adjusted

during a turn, thus allowing relatively tight turns without causing ground damage.

## Low weight

The use of the electric motors also reduces the weight of the vehicle by eliminating the mechanical power train components.

"It really proved out in lightening our load quite a bit — we were taking almost 3,000 pounds out of the tractor," Tornnga said.

The design has further reduced vehicle weight by eliminating the need for two diesel engines — there's now just one engine driving the generator in the tractor and powering the trailer.

"On the existing system we have two engines — one on the cab and one suspended under the back deck on the trailer," Tornnga said.

A decision not to include a battery bank for balancing the electrical load of the drive system, as in a railroad locomotive, also minimizes vehicle weight. Batteries could assist braking and when driving uphill and regenerate on downhill sections.

"It's pretty flat up there (on the Slope), so you're not really regenerating your batteries," Tornnga said.

## Environmentally friendly

As well as providing an individually adjusted drive to each airbag tire, the electrical drive will reduce environmental impacts by eliminating drips and spills from the transmission fluids and lubricants needed for a mechanical system, Tornnga said.

"We see environmentally it's going to be a lot better too — we've reduced emissions, fuel consumption and reduced a lot of potential spills and still maintain the environmental protection the uniquely designed CATCO provides," he said.

And, although some other modern vehicle designs for tundra travel involve the use of rubber tracks rather than wheels, Tornnga thinks that the CATCO's wheeled design reduces the likelihood of tundra damage during turns and enables faster travel.

The bottom line is that we have a lighter vehicle that's able to carry a heavier load and ultimately reduced the costs per ton per mile for our customer while still maintaining the environmental protection of the tundra, Tornnga said. ●



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• GULF OF MEXICO

# Spinnaker unveils 'significant' discovery

U.S. Gulf ultra-deepwater gas find meets pre-drill reserve estimate of 100-125 bcf, will feed into Independence Hub

By RAY TYSON

Petroleum News Houston Correspondent

Independence Hub, scheduled to come on line in 2007, appears to have picked up a ninth "ultra-deepwater" natural gas discovery in the Gulf of Mexico that would help feed the offshore gas-processing facility to be shared by a half-dozen U.S.-based producers.

The discovery well at Spinnaker Exploration's "Q" prospect on Mississippi Canyon Block 961 turned up about 110 feet of "true vertical" gas pay and met pre-drill reserve estimates of 100 billion to 125 billion cubic feet, Spinnaker, the operator, said June 14.

"Spinnaker believes the discovery to be significant to its potential reserves and production," the company said, adding that the discovery well is currently being sidetracked to an up dip position in the reservoir to test sand continuity.

"If successful, the sidetrack well bore will be cased and utilized for production," Spinnaker said.

## Continuous, high quality pay

The discovery well encountered pay located in "a continuous, high quality" middle Miocene reservoir at a depth of 17,644 feet, the company said.

Spinnaker and partner Dominion Exploration & Production each hold a 50 percent working interest in the Q prospect, located in nearly 8,000 feet of water roughly 100 miles southeast of Venice, Louisiana. Well costs are expected to run about \$22 million.

The Q field is situated about 12 miles west-southwest of the future Independence Hub production platform, which is being



designed to process up to 850 million cubic feet of gas per day from various fields in the eastern Gulf region.

Independence Hub, to be located on Mississippi Canyon Block 920, will be moored in about 8,000 feet of water, qualifying it as the deepest development in the U.S. Gulf. It will process gas from eastern Gulf fields located in nearby Atwater Valley, DeSoto Canyon and Lloyd Ridge.

Spinnaker has participated in two other gas discoveries in the Independence Hub

project area, Spiderman and San Jacinto. Other discoveries that will be tied back to Independence Hub are Atlas, Atlas North West, Jubilee, Merganser, Vortex, South Dachsund/Mondo Northwest and possibly Q. In addition to Spinnaker and Q partner Dominion, Anadarko Petroleum, Kerr-McGee, Devon Energy and Murphy Oil hold varying interests in the fields that will be tied back to the hub, and are area members of the so-called Atwater Valley Producers Group. Except for Murphy, group members consist of exploration and production independents.

Marine construction company Cal Dive International took a 20 percent stake in Independence Hub, while Enterprise Products Partners, a leading provider of midstream energy services, was selected by the producers group to design, construct and install the hub, a 105-foot deep draft, semi-submersible platform with a two-level production deck.

## Owned by Enterprise, operated by Anadarko

The platform, estimated to cost \$385 million, will be owned by Enterprise and operated by Anadarko, which holds interests in

five of the contributing fields. The hub is being designed to handle production from up to 10 additional fields.

Enterprise also will own, install and operate 140 miles of 24-inch pipeline named Independence Trail. The pipeline, estimated to cost \$280 million, is to deliver production from Independence Hub into the Tennessee Gas Pipeline located on West Delta Block 68. Key engineering and fabrication contracts for the Independence Hub platform were awarded to Atlanta Offshore, Heerema Marine Contractors, Alliance Engineering, Kiewit Offshore and Allseas USA.

## Other deepwater wells

Earlier this year Houston-based Spinnaker was planning to drill or participate in five deepwater exploration wells in the U.S. Gulf during the balance of 2005, including Q.

The company hoped to spud its 100 percent-owned Egmont prospect on Mississippi Canyon Block 413 sometime late in the second quarter or possibly in the third quarter. That prospect could hold around 140 billion cubic feet of natural gas equivalent, or about 20,000 barrels of oil, according to the company. Well costs are expected to total around \$20 million.

Perhaps the most expensive exploration well planned by Spinnaker and partner Murphy this year is on their Krakatoa prospect on Mississippi Canyon Block 540.

## Spinnaker partner Anadarko plans to drill a third well at the Spiderman field in DeSoto Canyon, an effort that could produce 30-to 35 billion cubic feet of incremental gas reserves.

Well costs could run \$35 million to \$40 million, the company said. Pre-drill reserve estimates were pegged at 50 million to 100 million barrels of oil equivalent.

Spinnaker partner Anadarko plans to drill a third well at the Spiderman field in DeSoto Canyon, an effort that could produce 30-to 35 billion cubic feet of incremental gas reserves. The well is expected to cost between \$20 million and \$22 million.

Spinnaker and its partners also hope to drill a deep test well at their Front Runner field, which is producing around 30,000 barrels of oil equivalent per day with additional producing wells planned. The test well, which is expected to cost about \$35 million, is expected to spud in late 2005 or early 2006. ●

## ALASKA

### TAPS to shut down for maintenance

The Joint Pipeline Office said June 15 that the trans-Alaska oil pipeline will be shut-down for annual maintenance twice this summer, the first time on June 19 and 20.

"A variety of valve maintenance issues at pump station 7 and 12 will be performed under the strategic reconfiguration project and new pig launcher valves at PS 4 are the focus of this shut down," the joint federal and state agency said in its weekly newsletter. JPO will position staff to "conduct oversight" at pump stations 3, 4, 5, 7, 9, 12, the Valdez marine terminal, and at its Fairbanks and Anchorage offices.

Work is expected to take about 36 hours to complete.

A second planned maintenance shut down is scheduled for July 23 and 24, JPO said.

—PETROLEUM NEWS

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- Gulf of Alaska

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- Petrophysical Interpretation
- ArcView/GIS
- Commercial analysis
- Risk Analysis



• N P R - A

# BLM begins new plan for South NPR-A

Agency issues EIS notice, calls for oil and gas leasing nominations in 9.2 million acre area, asks if any interest in mining

By KAY CASHMAN

Petroleum News Publisher & Managing Editor

The U.S. Bureau of Land Management has issued a notice of intent to develop a new plan to guide the management of 9.2 million acres of public land in the southern portion of the National Petroleum Reserve-Alaska.

The plan, announced in the Federal Register June 15, will include an environmental impact statement.

The notice initiates the public scoping process and a call for nominations related to oil and gas leasing.

## Any interest in mining?

BLM also wants to know if there is interest in making "part or all of the planning area" available for hard rock or coal mining. Opening the area to mining would require Congressional legislation, the agency said.

Among other things, the plan will determine what lands will be made available for oil and gas leasing and under what conditions; determine appropriate ways to manage important habitat such as that for the western arctic caribou herd; and provide guidance for management of other resources and programs in the planning area.

The plan will also decide on the suitability or non-suitability of the Utukok, Colville and other rivers within the planning area as additions to the National Wild and Scenic Rivers System. Rivers that are found suitable may be recommended for designation by Congress, BLM said.

## Public input

BLM resource specialists will host a series of public information meetings at the following locations: Ambler, Anaktuvuk Pass, Anchorage, Atkasuk, Barrow, Buckland, Fairbanks, Kiana, Kivalina, Koyuk, Kotzebue, Nome, Point Hope, Point Lay and Wainwright.

Responses to the call for nominations related to oil and gas leasing are due by Aug. 26, and must be submitted in envelopes labeled "Nominations Related to the South NPR-A IAP/EIS" to protect the confidentiality of the nominations, BLM said.

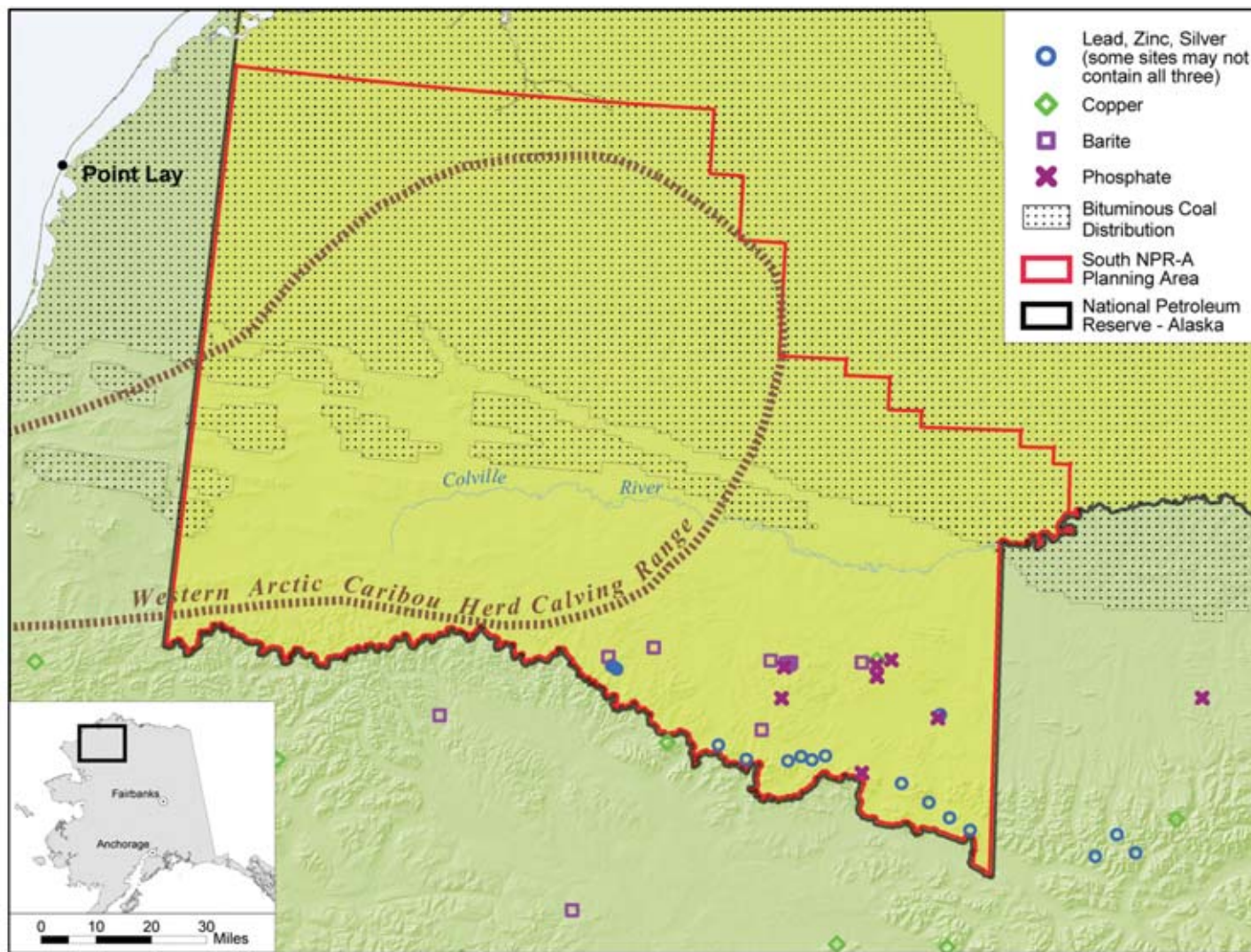
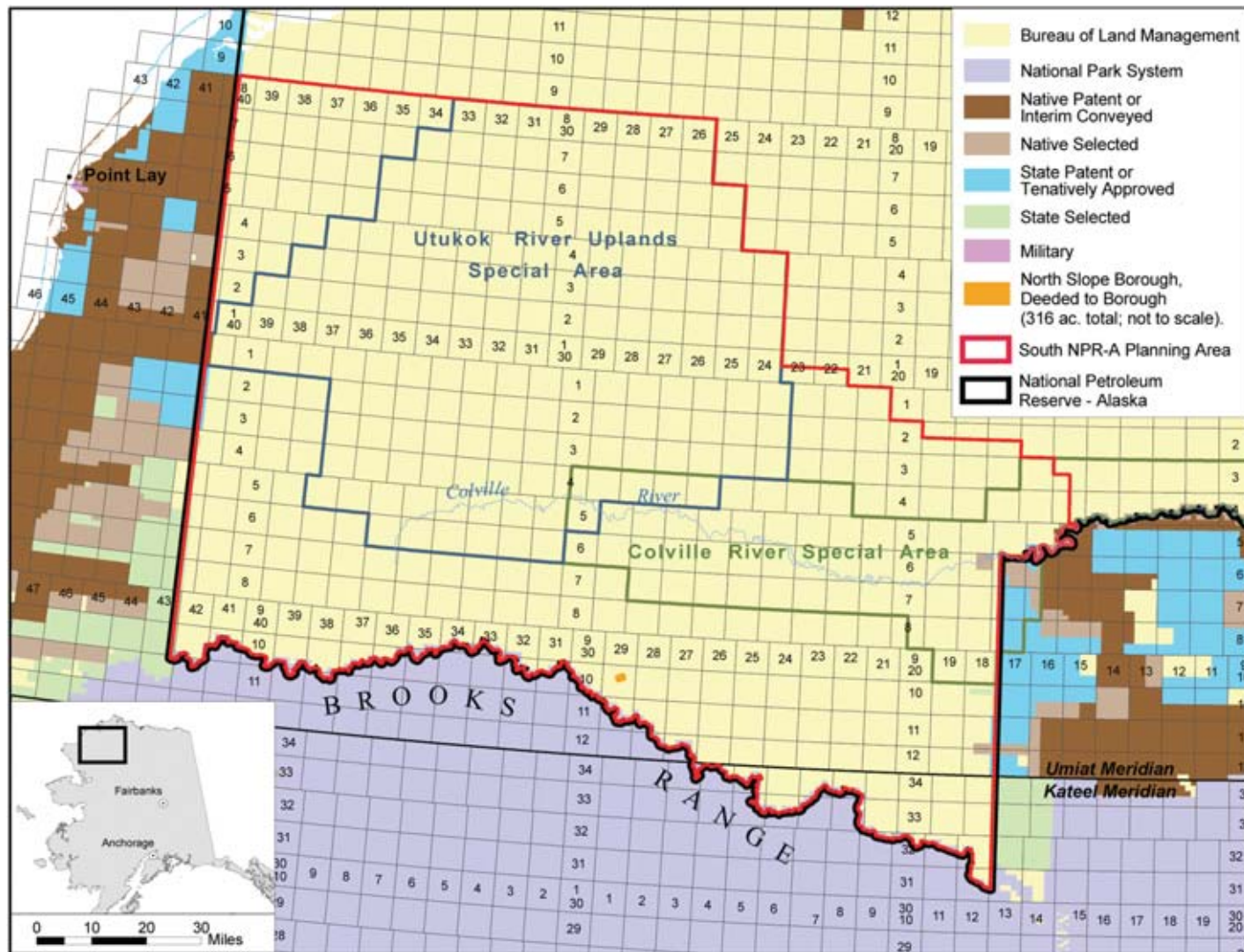
They are to be addressed to: Call for Nominations, South NPR-A Team, 222 West 7th Ave., No. 13, Anchorage, AK 99513-7599. Scoping comments, which can also be submitted by mail, are also due no later than Aug. 26 and should be sent in writing to South NPR-A Planning Team Leader at the same address.

## Legal description

The South NPR-A planning area begins (see adjacent maps) on the reserve's boundary on the township line between T. 8 N., R. 40 W. and T. 9 N., R. 39 W., Umiat Meridian, and then easterly along the township lines to the northeast corner of T. 8 N., R. 26 W., U.M., then southerly and easterly along township and section lines in a stair-step fashion to NPR-A's boundary where the Colville River flows from T. 5 S., R. 15 W. to T.4 S., R. 15 W., U.M., then generally westerly, southerly, westerly and northerly following the boundary of the petroleum reserve to the point of beginning.

Additional information about the plan, schedule, issues, and meeting dates will be periodically posted online at [www.blm.gov](http://www.blm.gov) until the BLM-Alaska website is restored.

In recent years BLM has completed plans for both the northeast and northwest portions of NPR-A. •



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## • NORTH SLOPE

# Looking for North Slope coalbed methane

The Franklin Bluffs well will test for coalbed methane and will also pioneer the use of a lightweight rig on the North Slope

By ALAN BAILEY

Petroleum News Staff Writer

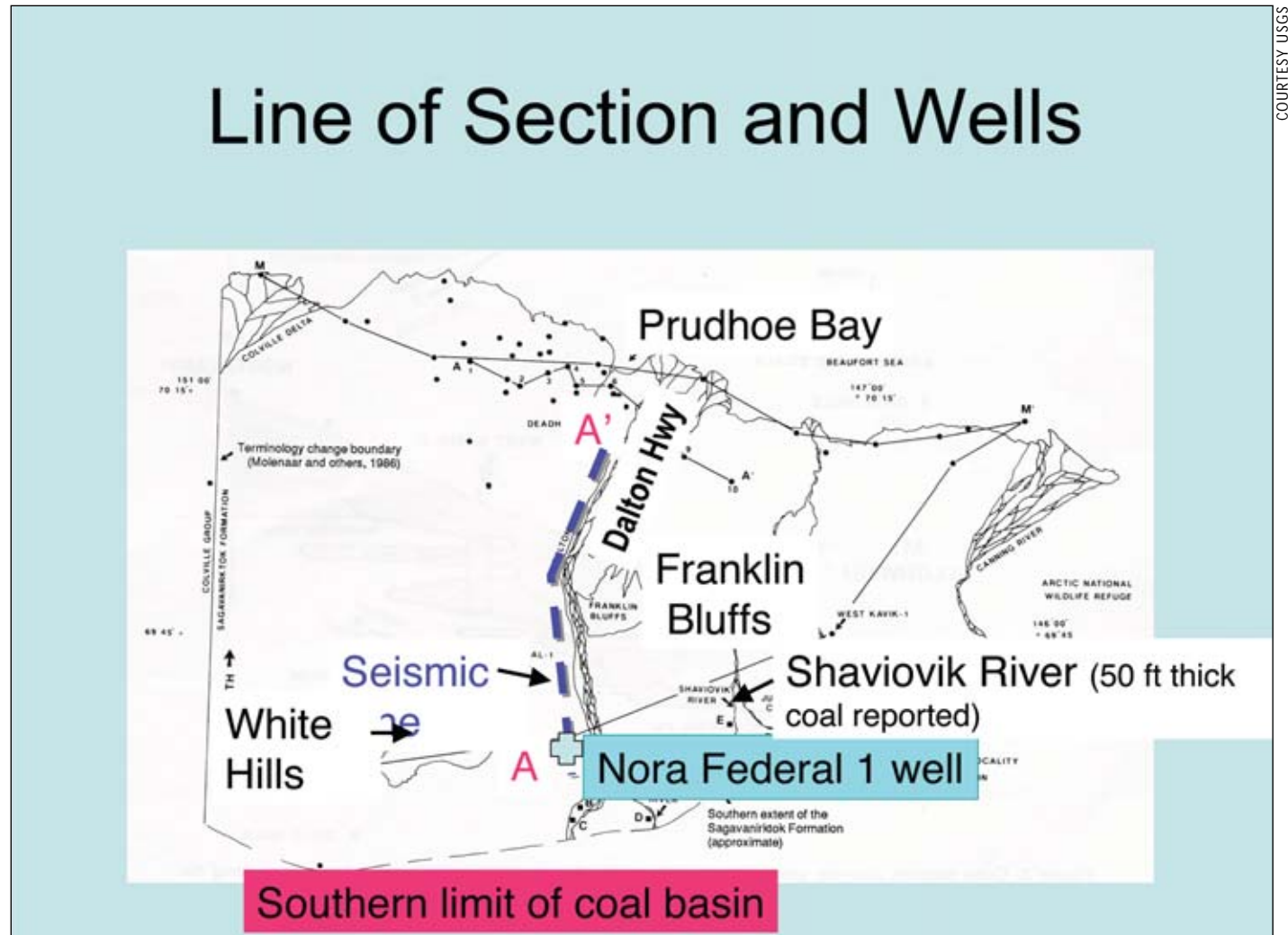
A cross-agency team that includes the Bureau of Land Management, the U.S. Geological Survey and the Alaska Department of Natural Resource will drill a test well at Franklin Bluffs in the central North Slope this summer using a lightweight drilling rig. The drilling forms part of a multi-year project to investigate coalbed methane as an alternative to diesel fuel as an energy source in rural Alaska.

"This will be the first coalbed methane test on the North Slope ... specifically drilled for coalbed methane," Charly Barker, senior research geologist at USGS, told Petroleum News.

The team has already investigated the potential for coalbed methane at Chignik on the Alaska Peninsula and at Fort Yukon in the eastern interior of Alaska. Although the other target area for investigation is Wainwright on the Chukchi Sea coast, the team is first going to drill the Franklin Bluffs test well.

We want to do some test drilling for coalbed methane in a permafrost area that's easily accessible before doing the Wainwright investigation, USGS drilling supervisor Art Clark said. The Franklin Bluffs well has multiple objectives, including drill testing in the permafrost, coalbed methane testing in permafrost and subsurface stratigraphic studies, Clark explained.

The team is using the CS 1000 drilling rig that it bought last year for its coalbed methane investigation at Fort Yukon. Although the Fort Yukon well encountered some thick coal seams, the gas content and



Map showing the location of Franklin Bluffs near the Haul Road south of Prudhoe Bay

permeability of the coal both turned out to be too low for practical gas production. However, the drilling rig proved very successful, USGS geologist Beth MacLean said — the well drilled to a depth of 2,287 feet.

"We're not sure what the depth capacity

of this equipment is," Clark said, "We're thinking it's going to be around 3,000 feet ... it's really small ... it's all engine and hydraulics."

The rig weighs just 10,000 pounds and breaks down into components, Clark said.

## Franklin Bluffs

The Franklin Bluffs drilling site is on an old construction pad just off the Haul Road, 40 miles south of Deadhorse.

"We want to know whether we can go in through the permafrost and continue down another 1,000 to 1,500 feet without the permafrost causing problems," Barker said.

"We're trying to do this while we're still in a place that's fairly accessible and easy to work out of, like Deadhorse," he said.

The well will penetrate Tertiary rocks of the Camden basin. There is potentially up to 175 feet of coal so we're looking at drilling as deep as 3,000 feet and coring as many of the major coal beds as we can, Clark said.

The state geological survey will also take drill cores to evaluate the subsurface stratigraphy — the well location is close to a seismic line, although the nearest existing well is about six miles away.

The team plans to do the drilling between mid-July and mid-August.

## Permafrost and coalbed methane

The coalbed methane investigation at Franklin Bluffs will focus on the extent to which permafrost impacts the gas and its production.

"We're going to look at the depth and character of the permafrost. We're going to look at coal and coal gas, how it's affected by permafrost," Clark said.

The team particularly wants to find out whether the permafrost has caused the gas to escape from the coal. Other drilling on the Slope has shown that the gas content of coal tends to drop or is missing altogether in the permafrost, perhaps because the gas

see FRANKLIN BLUFFS page 11



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continued from page 10

## FRANKLIN BLUFFS

has leaked through fractures caused by expanding ice. The Franklin Bluffs investigation will test this hypothesis and perhaps shed light on whether this type of gas loss is likely to pervade permafrost areas.

“If we can substantiate this in one well it would have a major impact on the resources of coalbed methane because we could lose the first 1,000 to 2,000 feet of coalbed (methane) across the North Slope,” Barker said.

The prime drilling depth for coalbed methane on the Slope extends down to 3,000 to 4,000 feet, so losses in the permafrost could represent about half of the total resource.

“It’s an enormous resource lost — several trillions of cubic feet,” Barker said.

### Drill rig testing

The relative ease of transportation of the lightweight rig that the team is using raises some intriguing questions about potential uses of this type of rig on the Slope for relatively low cost exploration or development. So a prime objective of the Franklin Bluffs well is to test the operation of the rig in deep permafrost.

“In this geologic setting how does (the rig do), what depth can we get — that will give us a better idea of what we can do with it later on down the road,” Clark said.

There’s also a question regarding how long a hole in the permafrost will remain stable and how long the hole will remain open.

“Most oil and gas rigs when they drill they’ll case off the permafrost and then continue drilling,” Clark said. “... We’re not going to case off our permafrost.”

However, the team will closely monitor mud temperatures, to see how these relate to ice, core and hole stability and to determine whether technology such as mud coolers is needed for this type of permafrost drilling.

Intriguingly, the well will penetrate the same Sagavanirktok formation that con-



The lightweight CS 1000 drilling rig in operation at Fort Yukon.

tains gas hydrates further north. So, although the team does not expect to find gas hydrates at Franklin Bluffs, the drilling tests should provide invaluable insights into the potential use of a lightweight rig for gas hydrate work.

“One of the things that’s being kicked around is can we use this equipment or similar equipment to do gas hydrate exploration,” Clark said. “... The gas hydrate people ... are very interested in this hole.”

### Wainwright

The test drilling at Franklin Bluffs is setting the stage for the Wainwright investigation — the team hopes to drill for coalbed methane in Wainwright in the summer of 2006 but still needs to find a substantial part of the funding for that project. The drilling will penetrate coal-bearing Cretaceous rocks down to 2,500 feet directly below the village.

What we’re trying to do in Wainwright is answer all the questions relating to coalbed methane in that environment — the geology, the gas content of the coal and the quality of the underground water, Clark said. The team is also going to test a new coalbed methane production technique involving the use of two wells. One of the wells will reduce the subsurface water pressure by pumping out water, so that the reduced pressure releases gas in the other well.

“We want to see if we can produce relatively freshwater through permafrost, a frozen zone, without losing the well or (running into) other problems,” Clark said. “... We’re not sure that anyone’s tried to do coalbed methane in high Alpine settings.”

Water disposal presents particular issues for coalbed methane production in a permafrost area because water will not dissipate or evaporate at the surface — excess water will need to be re-injected deep

underground below the permafrost.

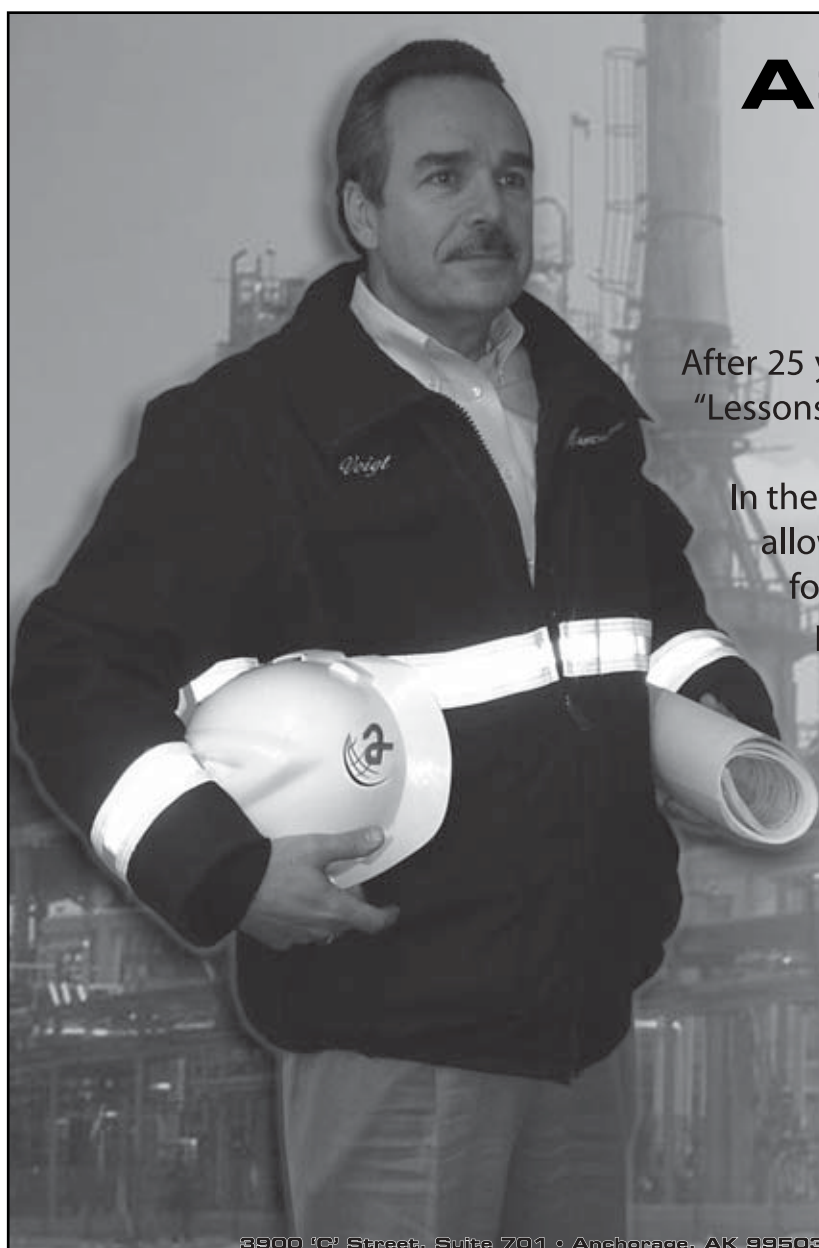
“We want to determine how much water would have to be produced to get the gas out and what’s the quality of that water,” Clark said.

Meantime the team is forging ahead with its plans for Franklin Bluffs this summer.

“The rig is at Fort Yukon now and its coming down on the barge in the next couple of weeks and then we’re going to pick it up in Nenana,” Clark said. ●

*Editor’s note: There is no road system connecting the North Slope to the rest of Alaska except the James Dalton Highway, formerly (and commonly) called the Haul Road. Built to facilitate the construction of the trans-Alaska oil pipeline in the mid-1970s, the gravel road essentially parallels the pipeline starting north of Fairbanks at Livengood and ending at Deadhorse in the Prudhoe Bay area.*

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• N O R T H E R N C A N A D A

# Mackenzie rescue mission in full swing

Imperial team leader credits federal government with 100% commitment to resolve "fundamentals;" movement on northern issues

By GARY PARK

Petroleum News Canadian Correspondent

Progress is being reported on multiple fronts to get the Mackenzie Gas Project back on track.

In the most upbeat assessment of recent times, the top executive with lead partner Imperial Oil said there has been 100 percent commitment from federal officials to resolve problems relating to the regulatory process and the demands of aboriginal communities in the Northwest Territories.

Imperial senior vice-president Michael Yeager said June 15 that the Canadian government has swung into action since pre-construction work was stopped in April, with all of the unresolved issues now getting attention "day and night."

He said a focused effort over the summer will determine whether environmental and regulatory hearings can start this fall.

"We need to get some fundamentals of our project ...not weird things, just basic terms and conditions so that we can do the work," Yeager told reporters in Calgary.

The talks over the last six weeks have led to a better

"understanding of responsibility," he said.

## Hints of a breakthrough

Meanwhile, there have been hints of possible breakthroughs between the federal government and the Deh Cho, whose land covers 40 percent of the pipeline route and in resource-revenue sharing with the Northwest Territories government.

Sources in the Northwest Territories say Deh Cho Grand Chief Herb Norwegian is heading to Ottawa to put the final touches on an agreement that would end lawsuits filed by the Deh Cho against the government.

The Deh Cho, Gwich'in, Inuvialuit and Sahtu communities have argued they should be able to impose taxes on the pipeline to cover the costs of social programs impacted by the project — a demand the Mackenzie partners have said would cost "hundreds of millions of dollars" and is properly a federal responsibility.

The Deh Cho and Sahtu still insist they want annual



MICHAEL YEAGER

**Imperial senior vice-president Michael Yeager said June 15 that the Canadian government has swung into action since pre-construction work was stopped in April, with all of the unresolved issues now getting attention "day and night."**

payments from the pipeline partners, separate of any government spending.

Yeager reiterated that the Mackenzie consortium has no role in paying for social programs, but the Mackenzie consortium has still to negotiate land access and benefits agreements with the First Nations and other land owners.

The NWT government has estimated its needs C\$100 million a year in federal money to cover pipeline-related housing, education and health needs until it concludes a deal with the Canadian government which it hopes will boost its share of resource revenues from 4 percent to 40 percent.

NWT Resources Minister Brendan Bell said those talks are also moving ahead. Premier Joe Handley is expected to meet with federal officials in the next few weeks. ●

continued from page 1

## WHENEVER

Speaking at a Canadian Association of Petroleum Producers investment symposium, he said rumors have been rife, but there has been no direct communication from Ottawa pointing to a specific date.

Spokesmen in the Natural Resources Department would only say no meetings are scheduled and no deadline has been set.

The pipelines and North Slope producers are in a holding pattern awaiting a ver-

dict on whether Canada will uphold the 1978 Northern Pipeline Act giving exclusive rights to TransCanada, or agreeing with Enbridge that others should be allowed to bid in a "fair, open and competitive" process.

Kvisle told the CAPP symposium that TransCanada's rights remain intact, regardless of Enbridge's claim that the 1978 legislation is outdated, and were supported in a November 2003 letter from then-prime minister Jean Chretien.

He argued that connecting Alaska gas into TransCanada's extensive pipeline network could slash tolls by C\$1 billion

a year.

Kvisle said it is also vital for Alberta to integrate Alaska gas "with existing pipeline systems ... and bring an economy-of-scale benefit."

He warned that if the producers go it alone, and build a "bullet line" through Canada, Alaska gas will "steam right through" Alberta.

Daniel told the symposium that Enbridge is making a case to BP, ExxonMobil and ConocoPhillips for his firm to play a role in building and operating the pipeline.

However, he conceded the gas owners have a right to proceed on their own.

Speaking to a Canadian-American Business Council in Washington, D.C., on June 8, Ken Konrad, senior vice-president of BP Exploration Alaska, said the trio is concerned that if Ottawa chooses to go exclusively with the Northern Pipeline Act it could inject "unwanted and unnecessary" delays into an already drawn-out process.

He said BP would prefer that the government leave the legislation intact while opening the door to a fresh round of bidding before the National Energy Board.

Kvisle told the Washington confer-

ence that the Northern Pipeline Act is the fastest way to build the pipeline because it eliminates virtually all bureaucracy in Canada.

But he indicated TransCanada is ready to work with the producers to complete the entire project.

"We recognize that the producers at Prudhoe Bay will be a deciding factor," he said.

Meantime, Yukon Premier Dennis Fentie said in a statement June 8 that elements of the Northern Pipeline Act are good for his territory, especially the "certainty" afforded by "access to and egress from the future line," existing certificate and a pipeline corridor protected by law.

The act "provides certainty to industry as the right of way is recognized as a third party right," he said.

Fentie said the legislation "creates a Yukon advantage," while any projects regulated by the National Energy Board "may encounter significant challenges in these areas."

However, Fentie assured Northwest Territories Premier Joe Handley that the Yukon supports development of the Mackenzie Gas Project as well to ensure that the northern Yukon's gas reserves "are not stranded." ●

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## CANADA

### Energy exports headed for downturn

Canadian energy exports, mostly to the United States, have another year of growth before taking a dip in 2006, says Export Development Canada.

Sales will reach C\$75 billion this year, an increase of 9 percent from 2004's C\$68.4 billion, largely reflecting price and volume gains in crude petroleum.

But a slowing global economy and a stabilizing U.S. dollar will contribute to slippage in 2006, based on EDC forecasts of a drift in average oil prices from US\$45 a barrel this year to US\$38 in 2006. If the federal department is on the mark, the value of petroleum exports will tumble by 14 percent, following increases of 14 percent this year and 20.5 percent in 2004. Natural gas shipments will retreat by 7 percent, more than canceling out increases of 2 percent in 2005 and 3.7 percent in 2004.

The EDC says the dominant exporting province of Alberta will experience a 10 percent decline in 2006, ending a sustained run of increases that are expected to culminate this year in revenues of C\$50 billion.

British Columbia is expected to post a 10 percent gain this year to more than C\$5 billion, pulled by strong coal prices and higher gas production.

Saskatchewan will buck the trend, rising by 6 percent in 2006 after this year's forecast C\$3.2 billion, helped by surging worldwide demand for uranium.

East Coast exports are projected to reach almost C\$2.6 billion this year, then fall by 12 percent in 2006.

—GARY PARK



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Air Liquide	
Air Logistics of Alaska	
Alaska Airlines Cargo	
Alaska Anvil	16
Alaska Coverall	
Alaska Dreams	
Alaska Interstate Construction	
Alaska Marine Lines	
Alaska Railroad Corp.	
Alaska Rubber & Supply	
Alaska Steel	
Alaska Telecom	
Alaska Tent & Tarp	
Alaska Textiles	
Alaska USA Mortgage Company	3
Alaska West Express	
Alaska's People	
Alliance, The	
Alpine-Meadow	
Alyeska Prince Hotel	
American Marine	14
Arctic Controls	
Arctic Foundations	
Arctic Fox Environmental	
Arctic Slope Telephone Assoc. Co-op	
Arctic Structures	
Arctic Wire Rope & Supply	
ASRC Energy Services	11
Engineering & Technology	
Operations & Maintenance	
Pipeline Power & Communications	
Avalon Development	

## B-F

Badger Productions	
Baker Hughes	
Broadway Signs	
Brooks Range Supply	
Canspec Group	
Capital Office Systems	
Carlile Transportation Services	5
Carolina Mat	
Chiulista Camp Services	
CN Aquatrain	
Colville	
ConocoPhillips Alaska	
Construction Machinery Industrial	
Coremongers	10
Crowley Alaska	
Cruz Construction	10
Dowland - Bach Corp.	
Doyon Drilling	
Doyon LTD	
Doyon Universal Services	
Dynamic Capital Management	
Engineered Fire and Safety	5
ENSR Alaska	
Epoch Well Services	
ESS/On-Site Camp Services	
ESS Support Services Worldwide	
Evergreen Helicopters of Alaska	
Fairweather Companies, The	
Friends of Pets	

## G-M

Gene's Chrysler	
Great Northern Engineering	
Great Northwest	
Hanover Canada	
Hawk Construction Consultants	
H.C. Price	
Hilton Anchorage	15
Holiday-Parks	
Horizon Well Logging, Inc.	
Hotel Captain Cook	
Identity Wearhouse	
Industrial Project Services	
Inspirations	
Jackovich Industrial	
& Construction Supply	
JEMS Real Estate	
Judy Patrick Photography	
Kenai Aviation	10
Kenworth Alaska	

Kuukpik Arctic Catering	
Kuukpik/Veritas	
Kuukpik - LCMF	
Lasser Inc.	
LCMF	
LCMF - Barrow Village Response Team (VRT)	
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Lynden Inc.	
Lynden International	
Lynden Logistics	
Lynden Transport	
Mapmakers of Alaska	
Marathon Oil	
Marketing Solutions	
Mayflower Catering	
MEDC International	
MI Swaco	15
Michael Baker Jr.	9
MWH	
MRO Sales	

## N-P

Nabors Alaska Drilling	
NANA/Colt Engineering	7
NANA Oilfield Services	
Natco Canada	
Nature Conservancy, The	
NEI Fluid Technology	
Nordic Calista	
North Slope Telecom	
Northern Air Cargo	
Northern Transportation Co.	
Offshore Divers	3
Oilfield Improvements	
Oilfield Transport	
Pacific Power Generation	
Panalpina	
PDC/Harris Group	
Peak Oilfield Service Co.	
Penco	
Perkins Coie	
Petroleum Equipment & Services	14
Petrotechnical Resources of Alaska	8
PGS Onshore	
Precision Power	
Prudhoe Bay Shop & Storage	
PTI Travco Modular Structures	

## Q-Z

QUADCO	
RAE Systems	16
Rain for Rent	
Ranes & Shine Welding	
Renew Air Taxi	
Salt + Light Creative	
Scan Home	
Schlumberger	
Security Aviation	
Seekins Ford	
Smith Consulting Services	
SOLOCO Dura-Base	
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Storm Chasers Marine Services	
Sunshine Custom Promotions	
Superior Machine and Welding	
Taiga Ventures	
Tire Distribution Systems	
TOTE	
Totem Equipment & Supply	
Trinity Inspection Services	14
Udelhoven Oilfield Systems Services	
Umiat Commercial	
Unique Machine	
Unitech of Alaska	
Univar USA	
Usibelli	
U.S. Bearings and Drives	
VECO	
Welding Services	
Worksafe	
XTO Energy	2

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## Business Spotlight

By PAULA EASLEY



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Mike Harvey, Project Manager, PMP

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After entering the petroleum industry as an intern, Mike Harvey earned engineering degrees in Alaska and Montana and, during 27 years, has held a variety of industry positions. In 2004 he earned Project Management Professional certification. Mike and wife Melissa have two boys, nine and thirteen. Keeping all the outdoor activities, youth sports programs, Boy Scouts, Cub Scouts and woodworking projects straight challenges his management skills.



FORREST CRANE

Lonnie Jackson, Director

## Alaska's People

Originally formed in 1996 to promote the employment and training of Alaskan Natives, Alaska's People has evolved into what is now considered the Native employment specialists statewide. Since its inception Alaska's People has placed thousands of Native Alaskan, American Indian and Native Hawaiians into meaningful and rewarding careers at no cost to employers or employees.

Director Lonnie Jackson has more than 20 years in airline marketing and management and ten years of executive management experience with Alaska Native organizations in both for-profit and non-profit organizations. Drag racing, travel and watching movies are favorite activities. He and his wife Sherry have a son, Jake, and daughters Kayla and Kelsey. His immediate goal is to make it through their teenage years "without going crazy."



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continued from page 1

## SURVIVAL

• Changing Alberta government policy to promote ethane production, mirroring the royalty regime used to kick-start oil sands investment.

What happens to Alaska gas on its way to Lower 48 markets depends largely on how quickly the Canadian and Alberta governments resolve the regulatory issues standing in the way of a pipeline, a Canadian Energy Research Institute petrochemical conference was told June 8.

### Alaskans might opt for bullet line

Dave Tulk, director of strategic development and feedstock at Nova, said that unless the governments provide early leadership, the North Slope producers may opt for a bullet line over an Alberta hub, regardless of the higher cost.

But he said cost will not be the determining factor when the volumes of gas from Alaska could cover the cost of a US\$20 billion pipeline within a couple of years.

Ramesh Ramachandran, president of Dow Chemical Canada, told the conference that he hopes the three-way talks will result in government policy that offers an alternative to the export of raw ethane out of Alberta.

He said it is time for the Alberta government to support the massive cost of an infrastructure that would gather all of the ethane produced in Alberta for use within the province.

To that end, he said petrochemical producers favor a royalty mechanism that encourages ethane production from gas gathering systems, without penalizing gas producers in the process.

"Upgrading of ethane to ethylene is no different from upgrading of tar sands to bitu-

men and energy-producing products," said Ramachandran.

In acknowledging the high front-end costs of oil sands operations, producers pay a 1 percent royalty until they recover their capital investment.

### Walking away an option

For years, petrochemical companies have periodically warned that they are prepared to walk away from their Alberta investments if the economics are unfavorable.

Ramachandran said "make no mistake ... we are for-profit companies and we are not motivated to stay here out of altruism."

He said Dow has already moved some of its non-Alberta production closer to overseas markets where stranded gas is available for a fraction of North American prices.

The message for Alberta which is "basically out of the global petrochemical market," is that it faces a shot of "harsh reality" after three strong decades, he said.

Ramachandran said there is no chance that Alberta can compete in the Middle East, but government policy should keep the province on an even footing with the U.S. Gulf Coast, given that Alberta has access to the world's largest market for ethylene products and sits on one of the world's largest ethane resources.

The Alberta Energy and Utilities Board has estimated the province's remaining ethane supply at about 123.9 cubic meters of extractable reserves and about 62.3 million cubic meters left in the marketable gas stream that is theoretically extractable.

Combined, that potential is enough feedstock for at least 13 years based on the 13.7 million cubic meters extracted in 2003.

But the board calculates that there is actually sufficient ethane gas to meet current demand for 25 years.

It said in its 2003 report the "remaining ultimate potential for liquid ethane is considered to be those reserves that could reasonably be recovered as liquid from the remaining ultimate potential of natural gas."

Ethane extraction averaged about 41,200 cubic meters per day in 2004 and is expected to remain in that range for up to six years, but still well short of the 60,000 cubic meters per day of capacity.

### Alberta liquids heating U.S. homes

What troubles the petrochemical industry is the knowledge that high volumes of liquids-rich gas are being shipped out of Alberta and end up heating U.S. homes.

The ethane issue has been an open sore in Alberta since the 1.3 billion cubic feet per day Alliance pipeline came on stream in 2000, offering a direct link from northern British Columbia, across Alberta to the Chicago area's Aux Sable liquids extraction and fractionation plant that has capacity to handle 40,000 bpd of ethane and 30,000 bpd of other gas liquids.

That lost opportunity was blamed on the Alberta government's decision to remove a caveat that ethane should not be sent down the pipeline, leaving the petrochemical companies seething, although gas producers

argued that the petrochemical sector has passed up the chance to sign long-term contracts for feedstocks during 25 years of surplus ethane supply.

When today's economics are taken into account, analysts say it makes far more sense to build a new petrochemical plant in Chicago, closer to the end market.

One new hope for averting supply problems is the prospect of building a new refinery to remove ethane from the oil sands.

### Using Alaska liquids should be requirement

Former Alberta premier Peter Lougheed, who was instrumental in building a petrochemical industry in the 1970s, said in 2003 that using the oil sands could be an "incredible new page."

Whatever else, however, he said the Alberta government should require liquids from Alaska gas to be extracted in the province.

"I'd play the card and I might not win, but I would not let that natural gas keep just flowing past our petrochemical plants without requiring that ethane to be taken out," he said.

The Alberta Energy Research Institute has agreed that the massive wave of new oil sands projects could offer a feedstock source.

An institute-sponsored study concluded that a model integrating oil sands upgrading, refining and petrochemical units is economically and technically feasible, but conceded there was much work still to be done.

The study estimated the cost of a new refinery in the Edmonton area at C\$8.5 billion, while the integrated project model would generate internal after-tax returns of 15.2 percent.

The use of mined oil sands and bitumen in petrochemicals might also benefit bitumen producers, by allowing them to diversify their market options.

But the institute said that a role for the oil sands would require a cross-industry consortium, while the government might have to share some of the risk.

### Government not considering

Alberta Energy Minister Greg Melchin told a Canadian Energy Research Institute gas conference in March that the province should play a role in ensuring that Arctic gas becomes a source of feedstock to maintain a "vibrant petrochemical industry," but he hastened to add that the government was not thinking of regulatory intervention.

"We don't see that we're going to be able to compel that to happen," he said. "We just want to help ensure that we have the right structures in place."

Duke du Plessis, a senior energy advisor to the Alberta Economic Development Department, told the June conference that the government is weighing a possible role in a refinery/petrochemical complex, while making it clear "they don't want to interfere in the marketplace."

Several speakers at this month's conference said supply constraints on ethane are not the end of the road for the petrochemical sector, so long as it is prepared to diversify.

Gary Adams, president of Houston-based Chemical Markets Associates, said the high cost of energy in North America and low-priced Middle East natural gas has increased pressure on the sector to "reposition your business."

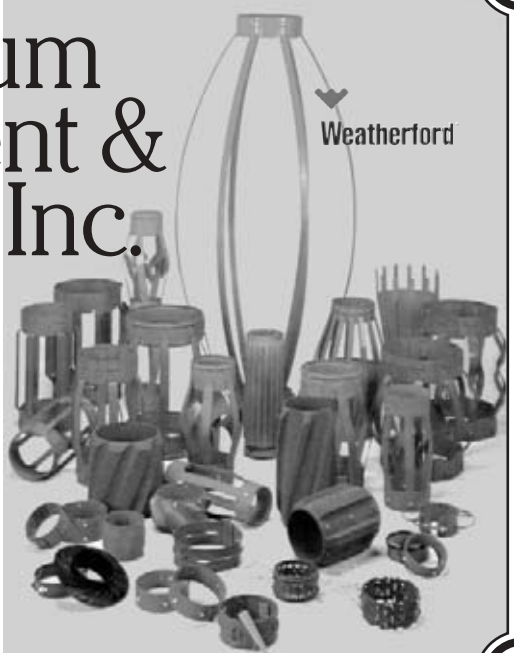
He said Alberta could move along the plastic value chain from ethane to other co-products that could be derived from sources such as refining and downstream oil sands.

Adams said combining paraxylene with ethylene glycol to make polyesters would open the door to a market where demand growth has been in the double digits for years. ●

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continued from page 1

## JACK-UPS

### Day rate in U.S. Gulf at \$62,000

Richard LeBlanc, vice-president of investor relations for contract driller Ensco International, said in May at the RBC Capital Markets energy conference he expects "a minimum" of five to six jack-ups to depart the U.S. Gulf for international markets over the next year.

**Saudi Aramco has seven rigs under contract and has told Rowan it plans to have 18 rigs under contract in two years.**

"Demand is shifting to the Eastern Hemisphere from the West," he said, adding that while the U.S. Gulf remains an attractive jack-up market, national oil companies are "competing for rigs very aggressively, committing significant dollars to getting those rigs."

The average day rate for a Rowan jack-up in the U.S. Gulf is about \$62,000, compared to the industry average of \$48,000, Rowan chief executive Danny McNease said at the RBC conference, noting that contract driller Diamond Offshore recently signed a contract for about \$77,500 a day.

He said the U.S. Gulf jack-up fleet already is essentially fully utilized and that "rigs capable of working are probably working in the Gulf of Mexico. We'll continue to bid higher (and) we think we'll be successful because markets are going to continue to tighten."

### Rigs will get pulled if rates don't increase

Nevertheless, "rigs are going to be pulled out of here if the rates don't go up," McNease warned. "I mean people are bidding all over the world."

He said national oil companies have asked Rowan what it would take to move more jack-up rigs to the Middle East.

"Well the answer to that are higher day rates and long-term contracts," McNease said. "And that's what these people are offering."

For example, Saudi Aramco has seven rigs under contract and has told Rowan it plans to have 18 rigs under contract in two years, McNease said.

"Where are these rigs going to come from?" he said. "Where are the rigs going to come from for these other national oil companies that want to increase their activity? Those rigs are going to come out of the Gulf of Mexico, or come from the new build construction."

### Ensco gets \$110,000 per day in Middle East

Ensco is said to have secured a Middle East rig contract valued at nearly \$110,000 per day, and industry analysts believe rates in that region eventually could top \$120,000 per day or more.

LeBlanc said roughly half of the Middle East jack-up fleet is dedicated to drilling for gas to support liquefied natural gas (LNG) projects in the region.

"We also believe this market has legs to it ... when you consider the significant investments being made in LNG today," he said. "To develop this stranded gas, drilling will take place."

McNease said one "super-major" oil company asked Rowan what it would take to move one of Rowan's premium, high-specification jack-up rigs to the U.S. Gulf from offshore Eastern Canada once work there is completed.

"Well the answer to that is it's going to be a day rate greater than \$150,000 because that's what we think we can get in the North

Sea," he added. "That's the kind of thing that operators are going to have to face up to. If they're going to participate in the Gulf of Mexico, they're going to have to match the day rates we're able to get for those high-end rigs around the world."

### Availability of premium rigs nil to none

In fact, the availability of premium jack-ups that can drill below 15,000 feet to depths of 25,000 feet or greater are nil to none. Only about 10 percent of the worldwide jack-up fleet is classified as premium.

"Increasingly we're seeing our customers wanting a larger, more capable drilling rig," Ensco's LaBlanc said. "These are the ones that are really going to be doing the more difficult drilling going forward."

In addition to the Middle East and India, LeBlanc said Ensco expects rig shortages in Africa and sees growing demand for high-end jack-ups in such Asia-Pacific regions as Australia, where rates currently range from \$90,000 to \$130,000 per day.

"Again, I think this is a reflection of a very tight market," he said. "Operators are having difficulties selling programs and now have to look to 2006 to get some of that work done."

**LeBlanc said roughly half of the Middle East jack-up fleet is dedicated to drilling for gas to support liquefied natural gas (LNG) projects in the region.**

Weatherford's Duroc-Danner said his company is targeting national oil companies that desire "one-stop shop" oilfield services.

"They are showing a keen interest in having engineering planning, logistic coordination, drilling efficiencies ... managed with as few contractors or vendors as possible," he added.

### Only six of new builds are premium rigs

Of the 30-plus new builds expected to hit the market in a few years, only six of them are the kind of "super-premium" jack-up rig that can reach "ultra-deep" gas prospects on the U.S. Gulf's continental shelf, Rowan McNease said.

"All the easy stuff has been done," he said. "We're going deeper. We're going into more harsh environments. And that's what people keep forgetting. They think a drilling rig is a drilling rig. It's not. Each rig has its own capability." ●

## Cook Inlet jack-up rig mobilization tough, getting tougher

Getting a jack-up rig to Cook Inlet won't get easier in the future, if current trends continue.

The Alaska Legislature sliced a \$6 million rig mobilization item from its capital budget, after showing strong early signs that it would support the request from the governor's request for funding.

The world market for jack-up rigs was red hot when Gov. Frank Murkowski requested money to help bring one to Alaska, and rates have gone higher since.

"That makes more work for us when we actually go to drill," said Danny Davis, president of Houston-based independent Escopeta Oil, one of the inlet's largest state oil and gas leaseholders. Escopeta will need a jack-up rig to tap giant oil and gas structures the company thinks it has in its Kitchen and East Kitchen prospects.

Davis said the money would help, and he hopes the state will get involved once a company announces it will bring a rig to the inlet.

The missing ingredient in the Cook Inlet jack-up rig puzzle has been a lack of a single company or group to step up and take on the rest of the cost of mobilization.

Predicting actual mobilization and demobilization costs is tough, but high estimates say the cost will now exceed \$20 million. Mobilization costs are pushed higher by the fact that there are no U.S.-built transport vessels capable of carrying a jack-up rig to the state, triggering Jones Act restrictions on foreign flag vessels carrying freight between U.S. ports.

The state adopted a cost estimate of \$12 million and proposed meeting industry half way, according to Mark Myers, director of the Division of Oil and Gas.

To make a deal, the state needs up front commitments from companies that want to use the rig, Myers told Petroleum News in March.

A recent U.S. Department of Energy report on Cook Inlet basin natural gas hypothesizes that large oil and natural gas fields remain to be found there. U.S. Geological Survey scientists calculate that only 4 percent of the oil which could have been generated by Cook Inlet basin source rocks has ever been identified.

Rising natural gas demand in Southcentral Alaska is projected to sharply intersect declining production in the next few years. Consumers face higher rates, and industrial users such as Agrium Nikiski nitrogen fertilizer plant, will be left out of the picture if new economic sources of gas are not found.

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continued from page 1

## INSIDER

If the recent past is any indication, those skills will need some sharpening.

Twice in the last three years, PetroChina has made fumbling attempts to take over Husky Energy, one of Canada's five integrated oil companies.

Its first bid in 2002 apparently collapsed when it was unwilling to pay any sort of premium for Husky's impressive bundle of assets, including extensive oil sands reserves and a heavy oil upgrader.

That produced a blistering comment from Husky chief executive officer John Lau, who said: "You don't expect to get a Cartier watch by paying a Seiko price, right?"

There was fresh speculation late last year that either PetroChina or Sinopec were pondering a takeover bid for Husky.

When a firm offer failed to materialize, Lau observed that the Chinese government apparently "doesn't know what it wants ... I don't think it knows how to do a transaction."

The full extent of the missed opportunity in 2002 is now apparent.

At the time Husky carried a market value of C\$7 billion. Following an 80 per-

cent gain in share values over the last year, it is now worth more than C\$19 billion and is moving ahead with its own C\$10 billion oil sands project.

It will be interesting to see if the Chinese have absorbed a lesson from that experience as they again enter the global marketplace. CNOOC, China's third largest oil producer and an arm of state-owned China National Offshore Oil Corp., has confirmed it is weighing a "possible" competing bid to top Chevron's US\$16.4 billion offer for Unocal.

### Newfoundland's good cop, bad cop

**BLUNT-TALKING NEWFOUNDLAND** Premier Danny Williams has a diplomatic side.

He's Ed Byrne, natural resources minister in Williams' cabinet.

It was Byrne who was dispatched to Calgary about a week after his boss sent a nervous tremor through the petroleum industry when he demanded a better financial deal for his government from future offshore oil and gas projects.

In meetings with the Canadian Association of Petroleum Producers, Byrne said that although Newfoundland believes it is entitled to more generous returns dur-



DANNY WILLIAMS



ED BYRNE

ing a period of high commodity prices it won't impose any changes retroactively.

All the province is seeking is a chance to remain competitive with similar jurisdictions, Byrne said.

That was a softer line than Williams' threat to leave resources in the ground if it can't squeeze a better deal from the industry.

Byrne said the government is assessing other royalty regimes to position itself for what it anticipates will be much greater development of the Atlantic continental shelf. He said only 130 exploratory wells have been drilled in just a few of the 20 major geological basins that represent one of the world's "largest unexplored regions."

Byrne said the Newfoundland offshore, which produced its first barrel only eight years ago, is still in its infancy, although he conceded that the region carries high costs

and high risks.

Industry officials pointed out to Byrne that the successful industries in Alberta and British Columbia are underpinned by favorable royalty and regulatory regimes.

They also noted that the industry has accounted for half of Newfoundland's economic growth over the past eight years, 15 percent of its Gross Domestic Product, has paid C\$500 million in royalties and employs 7 percent of the work force.

### Cassandra still looking for Katalla well investors

**CASSANDRA ENERGY IS STILL** LOOKING for investors for its Katalla test well 56 miles southeast of Cordova, company President Bill Stevens told Petroleum News in early June.

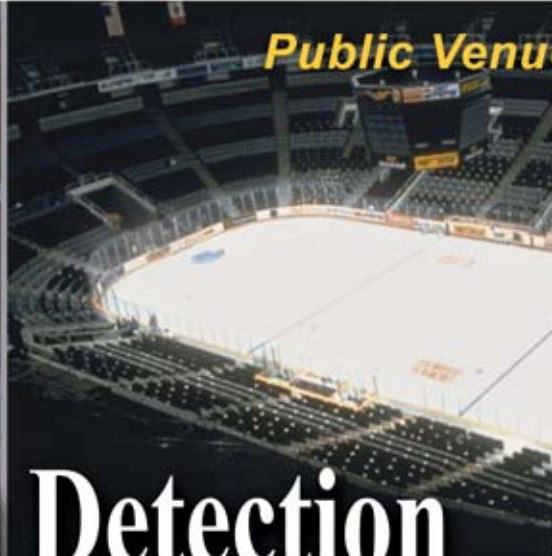
Late last year the Alaska-based independent decided to cut back its drilling program from two or three wells to one well. The project is on private land near the former town of Katalla, the site of Alaska's first commercial oil production in 1902. The field was shut in following a refinery fire in 1933.

Cassandra, which is owned by a group of private investors, is looking for partners or investors for the Katalla project and is hoping to mobilize equipment yet this year.

Remediation



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# NORTH OF 60 MINING NEWS

**2 Chandalar's glowing legacy**  
*Century-old heritage of discovery meets modern development in Brooks Range gold mining district*

**4 BLM seeks responsible parties**  
*Finding someone connected with mines abandoned decades ago is challenge on both sides of border*

**11 Another Kuskokwim Delta gold hunt**  
*Calista signs lease with California mining company seeking to explore 57,600 acres in Nyac District*

GABION STRUCTURES FORM THE CENTERPIECE OF THE CREEK STABILIZATION MEASURES AT CLINTON CREEK MINE

PHOTO BY SARAH HURST

*A special supplement to Petroleum News*

WEEK OF  
June 19, 2005

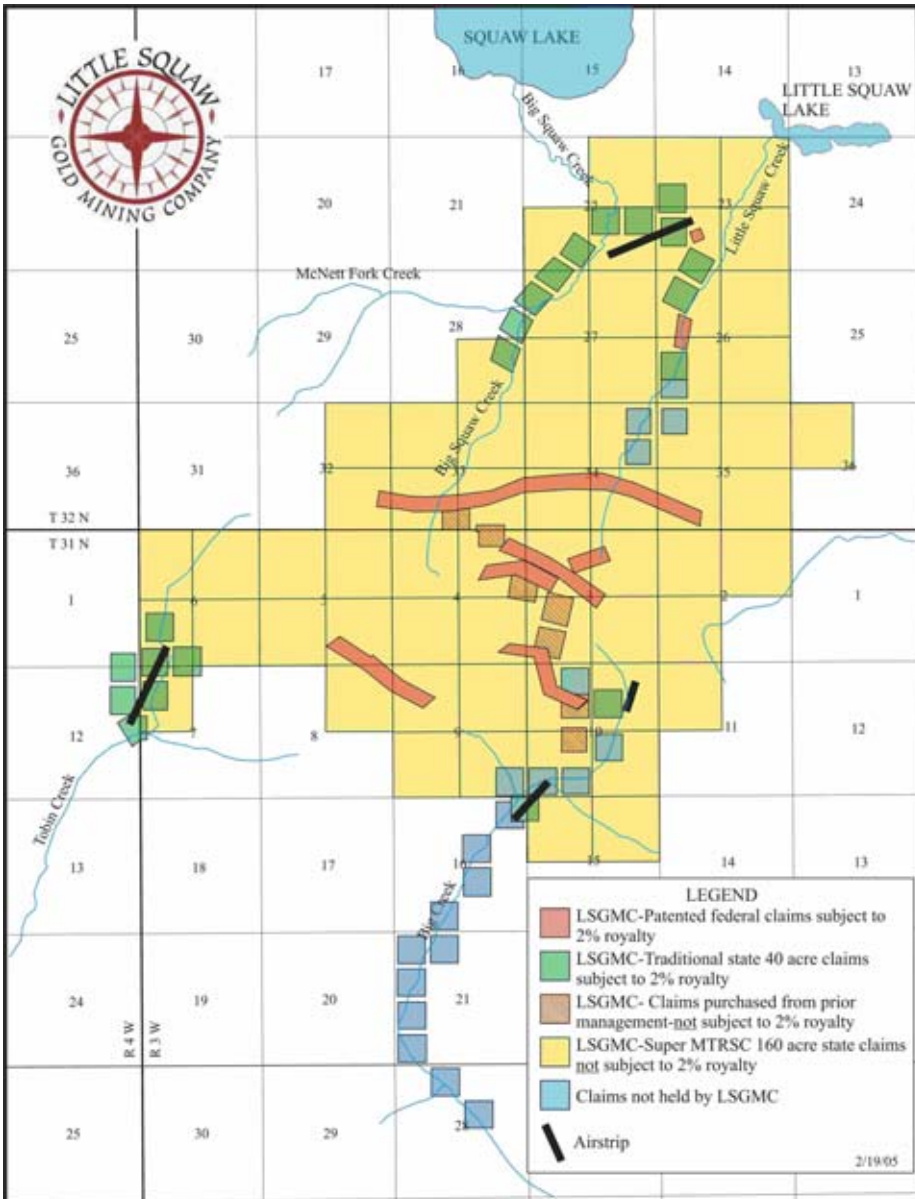
**Petroleum**  
news



• BROOKS RANGE ALASKA

# Chandalar possesses glowing legacy

Century-old heritage of discovery meets modern push for development in remote Brooks Range gold mining district



By ROSE RAGSDALE

Mining News Contributing Writer

In the waning days of the Klondike Gold Rush, the Arctic tundra far to the north gave birth to another Alaska gold mining legend. Japanese sailor Frank Yasuda left a whaling vessel to make his home among the Inupiat people at Point Barrow.

A few years later, disease and hardship had decimated the village of Barrow.

Yasuda, an enterprising fellow, and his young Inupiat wife, Eneveloe, joined another explorer in traveling south to the Brooks Mountain Range in search of a new home for the people of Barrow. Near Chandalar Lake 200 miles north of Fairbanks, Eneveloe Yasuda stumbled upon huge gold nuggets in the waters of a small tributary, later named Little Squaw Creek in her honor. That gold discovery enabled the Yasudas to bring Inupiat villagers south to establish the community of Beaver, Alaska.

For his deeds, Frank Yasuda entered history as the "Alaskan Moses" and is the subject of a book, "An Alaskan Tale," by Japanese author Jiro Nitta. The Yasudas also have been inducted into the Alaska Mining Hall of Fame, according to amateur historian Chuck Hawley.

A century later, Eneveloe Yasuda's legacy of discovery lives on in the story of the Little Squaw Gold Mine as modern explorers seek to uncover sizable gold deposits geologists suspect lie virtually undisturbed in the Chandalar district.

Led by Spokane, Wash., geologist and businessman Richard Walters since 2003, Little Squaw Gold Mining Co. has completed more than two years evaluation and study of drilling data from earlier exploration of its nearly 10,000 acres of mining claims, including 426 acres of patented land.

## Mining claims may be among state's richest

Thanks to an independent technical report on the mining claims and the outcome of its own preliminary assessment, the company is poised to explore the area in earnest.

Pacific Rim Geological Consultants Inc., hired by Little Squaw Gold in 2004, performed a technical analysis that found several of the placer deposits in the Chandalar district compare favorably with other glacier-fed deposits, such as Valdez Creek, Porcupine and Koyukuk-Nolan in Alaska and Bolotny-Ravkosky in the Russia Far East. Three out of four of these examples have

cumulative reserve and past production totals exceeding 500,000 ounces of gold, according to Fairbanks-based Pacific Rim. Only 84,000 ounces have been mined, so far, at Chandalar.

But it is the gold lodes, or veins, in the Chandalar district that really excite Walters. Pacific Rim said the lodes compare with worldwide examples that carry a high grade gold ore over large widths, and strike lengths.

"Placers could provide a fast cash flow, but the real potential of the property is the big quartz veins there," Walters said May 14. "We're very interested in the lode deposits, which we believe can host millions of ounces of gold."

Pacific Rim recommended further exploration of both lode and placer deposits in the district with an eye toward developing a small gold placer operation capable of producing 15,000 to 25,000 ounces of gold per year and identifying more gold veins, each with numerous high-grade ore shoots in excess of 1 ounce per ton. Each vertical shoot contains roughly 20,000 to 50,000 tons of gold ore, Walters said.

"When it's all added up, we believe we're going to have a few million ounces of high-grade gold," he said.

## Field work followed up report

Little Squaw Gold hired Barker to follow up on the technical report with summer field work last year. Those efforts identified six new gold-bearing veins, bringing to 30 the total number of known veins and vein swarms on its property. Only four of the veins have been significantly explored.

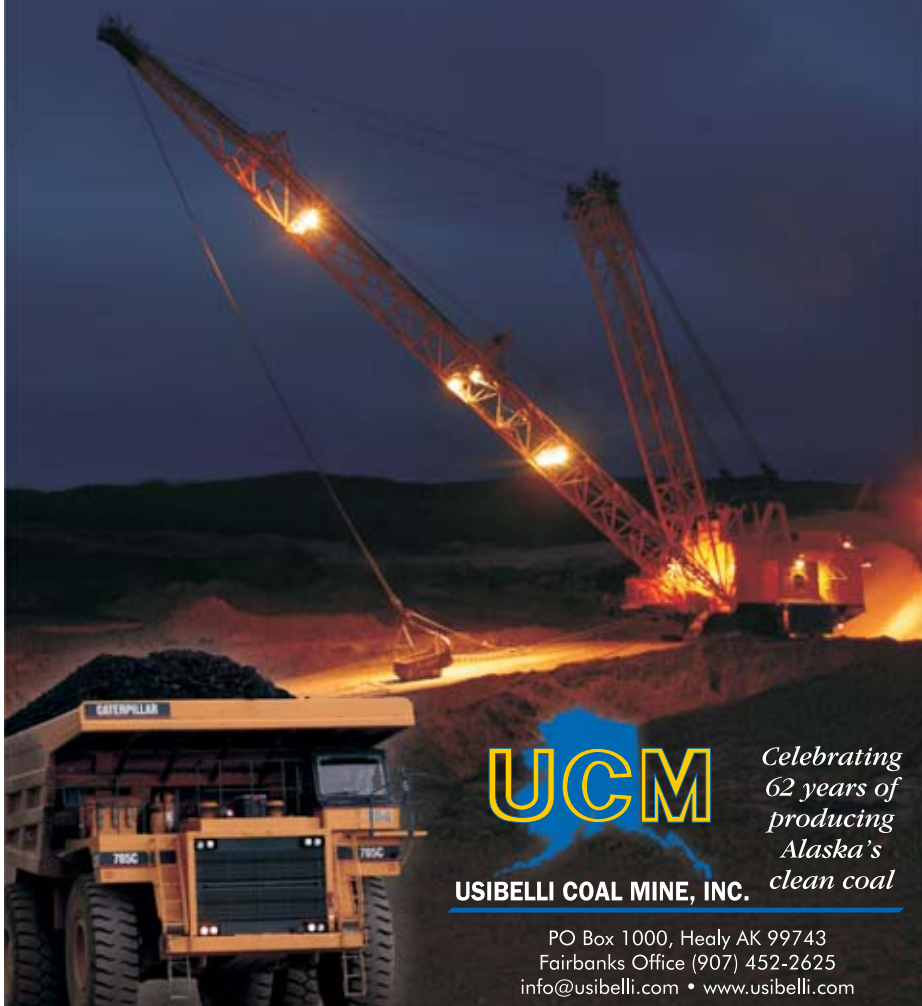
Little Squaw plans to continue exploring the property this summer, using geophysical techniques such as airborne magnetics and geochemical sampling to identify additional lodes on the property, which is densely covered with vegetation and debris.

"It is a technically challenging project," Walters added.

Little Squaw Gold is currently working to raise capital needed to accomplish a \$1.5 million work program, which would be a first-phase appraisal of both the area's placer and lode gold deposits, according to Walters.

The company got a boost recently when the state of Alaska filed suit against the U.S. Department of Interior to obtain a right of way to the 65-mile-long Coldfoot-to-Chandalar Lake Trail. A road from Coldfoot on the Dalton Highway to Chandalar would help to overcome the high cost of mining exploration and potential operations in the district. ●

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• ALASKA

# Red Dog wants to replace diesel with gas

Teck Cominco resumes search for new power generation fuel source for the Red Dog lead/zinc mine in Northwest Alaska

By ROSE RAGSDALE

Mining News Contributing Writer

Other mining projects may be jumping on the bandwagon, but Teck Cominco still leads the race to find local gas reserves to feed the voracious appetite of a large-mine power plant in Alaska.

Seven years after discovering gas deposits in shale near the Red Dog lead/zinc mine, the owner of the huge Northwest Alaska mine is ready to drill a two-well exploration program in hopes of replacing costly diesel fuel it must barge in every year.

Though oil companies have developed gas reserves to power production facilities on the North Slope and on Cook Inlet platforms for years, Teck Cominco is the first mining company to attempt it, Alaska Division of Oil and Gas petroleum land manager Patrick Galvin said June 9.

Companies associated with two other mining projects, Usibelli Coal Mine near Healy and Donlin Creek in the Yukon-Kuskokwim Delta, are also investigating the possibility of using local natural gas reserves for power generation.

"Red Dog is the farthest along in that they have begun to do some exploratory drilling to analyze what they actually have up there," Galvin said.

The huge transportation costs associated with operating remote mines in Alaska gives a local resource like shallow gas a "great advantage," he said.

And with diesel fuel costs up 30-40 percent, the State of Alaska believes a gas discovery on the Alaska Peninsula would spark interest in nearby mining sites and

**"Red Dog is the farthest along in that they have begun to do some exploratory drilling to analyze what they actually have up there."**

—Patrick Galvin, Alaska Division of Oil and Gas petroleum land manager

provide an affordable fuel for the fishing industry to make ice, Galvin said.

## Developing gas remains a challenge

Natural gas near Red Dog was discovered on NANA Regional Corp. land in the late 1990s by the mine's mineral exploration crews doing small-diameter core drilling.

"We know gas is in the rock, the question is whether it can be extracted economically," Red Dog mine general manager Rob Scott said June 8.

Teck Cominco has budgeted nearly \$4 million for this year's drilling along with six weeks of flow tests and construction of a one-mile access road. But it will likely take another 5 to 7 years to bring the gas to production, according to Scott.

A follow-up program to determine the size of the field in 2006 and then 3-5 years for permitting and drilling development wells means first gas could be anticipated in the 2010-2012 timeframe, he said. With 25 years of defined ore reserves left to mine at Red Dog, plus other nearby lead/zinc deposits still in the exploration phase, Teck Cominco will need plenty of fuel.

But Teck Cominco has yet to determine whether the gas can be developed, Scott cautioned.

He declined to say how much gas Teck

Cominco believes is locked in shale formations near the mine. An earlier company estimate pegged the gas resource in just one basin at more than 160 billion to 200 billion cubic feet of gas in place.

Teck Cominco would like to replace the 18 million gallons of diesel fuel that Red Dog currently uses to produce 25 megawatts of electricity annually at the mine and in the mine fleet, which delivers up to five barge loads of goods and equipment to Red Dog and hauls out lead and zinc ore during the short ice-free shipping season between June and October.

Replacing the diesel would require about 3 bcf of natural gas per year, Scott said.

## Gas offers environmental benefits

Developing the gas also would provide significant environmental benefits,

including reducing emissions and the handling of diesel fuel.

Teck Cominco has four shallow gas leases covering 23,040 acres of land north and east of the mine. Issued in 2000, the leases were extended for a second three-year term in 2003. Teck Cominco pays the state annual rent of 50 cents per acre.

This year, drilling is scheduled to start in early July. Each hole will be six inches in diameter, and relatively shallow at about 3,000 feet, Scott said. "We'll be looking at the 2,600-foot to 2,700-foot horizon," he added.

A drill rig operated by NANA Dynatec will be shipped in with the mine's first barge delivery in early July and will be sent back this fall. Consultant Advance Resources International will oversee the drilling program, Scott added. ●

## ALASKA

### Forest Service approves plan of operations for Kensington gold project

As Mining News was going to press on June 15, the U.S. Forest Service announced approval of the modified plan of operations for Coeur Alaska's Kensington Gold Project, an underground gold mine north of Juneau.

The mine still needs a U.S. Army Corps of Engineers Clean Water Act permit and an Environmental Protection Agency National Pollutant Discharge Elimination System Permit which are expected soon, Alaska Gov. Frank Murkowski's office said June 15.



North of 60 Mining News is a monthly supplement of the weekly newspaper, Petroleum News. It will be published in the fourth or fifth week of every month.

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<b>Mary Craig</b>	CHIEF FINANCIAL OFFICER
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**ADDRESS**  
P.O. Box 231651  
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**EDITORIAL**  
Anchorage  
907.522.9469  
Canada  
farnorth@petroleumnews.com

**BOOKKEEPING & CIRCULATION**  
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• YUKON

# Help wanted: BLM seeks responsible parties

Finding people connected with mines abandoned decades ago is a challenge, but any contributions to the clean-up effort are welcome

By SARAH HURST  
Mining News Editor

The last week of May was no ordinary week in Yukon, Canada's most westerly territory. It was Mining and Geology week, and the historic wooden buildings in downtown Dawson City were plastered with brand new white and gold banners. "This Business Supports Placer Mining. Placer Mining Supports This Business," they proclaimed. But the geologists, engineers and biologists spending their days listening to talks at the Palace Grand Theatre and their evenings living it up at Diamond Tooth Gertie's music hall and casino were not in town to discuss digging for gold. Well, not much. Their primary purpose was to compare notes on the complex but essential science of mine reclamation, something that previous generations of miners too often preferred to ignore.

## Alternates between Canada and Alaska

The Northern Latitudes Reclamation Workshop is held in a different city every two years, alternating between Canada and Alaska. The opportunity to see Dawson and nearby mines, as well as the famous Dredge No.4 – the largest wooden-hulled dredge in North America, assembled in 1913 – was a treat for the participants, who trekked up from as far afield as Yellowknife in the Northwest Territories, Sacramento, California, and Cheyenne, Wyoming. Even arriving here by plane or car is a logistical challenge today, so it was easy to imagine how strong the pull of gold must have been for miners to brave the arduous journey a century ago.



George Stone, BLM Washington's program leader for abandoned mine lands

"The mining industry has always been the backbone of Yukon's economy," Kevin Brewer, director of mineral development at Yukon's Department of Energy, Mines and Resources, said in his introductory speech at the workshop. "Mining developments in Yukon must be managed in a sound and sustainable manner and provide benefits to all Yukoners. In this regard, we are currently designing a reclamation and closure policy to guide new hard rock mine developments in the territory. We have also recently created a major mine permitting team." There are no operating hard rock mines in Yukon currently, but five projects are moving forward towards development.

## Gold rush country appropriate setting

Gold Rush country was a very appropriate setting to look at how agencies can deal with abandoned mines. George Stone is the Bureau of Land Management's Washington, D.C. office program leader for abandoned mine lands. Most metal mines are in the west of the country and most coal mines are in the east, he said. There are an estimated 100,000-500,000 abandoned hard rock mines in the United States. "We in America do not have a nation-



Dredge No.4, assembled in 1913, is now a tourist attraction at the location where it used to work, a few miles outside Dawson City

al inventory of all abandoned mines," Stone said. "We think that we know where the significant abandoned mines are, the ones that are posing problems to human health, to the environment, particularly water pollution."

Nature will reclaim most of the sites, but around a quarter of them pose potential physical safety hazards to visitors, who climb around buildings and go into open adits, according to Stone. Roughly 5 percent of the sites pose environmental problems and account for the bulk of the cost because water treatment is extremely expensive. On the coal side, the Office of Surface Mining and state government agencies have compiled an inventory of some 13,000 sites. Most are in the east, but the bigger sites are in western states like Wyoming. The main problem with these sites is physical safety hazards.

## Use and occupancy another issue

Use and occupancy of abandoned mine sites is another issue, particularly on public lands. "Our mining laws are such that it doesn't take much for someone to stake a claim and ostensibly say they're doing some mining," Stone said. "In the southwest part of the United States this seems to happen an awful lot, and these folks are simply not doing mining, they're just looking for a place to park their camper, and while they're doing that, they're enjoying their stay on the public lands, making quite a mess."

Sites that used to be fairly remote are no longer remote

because of western population sprawl and increased use of ATVs for recreation. ATVs have been involved in several accidents on tailings piles, or driving up a hill and then falling down a mine shaft on the other side. There are even websites encouraging ATV users to visit abandoned mines, Stone said.

A "Stay out, stay alive" program organized by the Department of Labor's Mine Safety and Health Administration is aimed at educating school-age children about the dangers of visiting abandoned mines, with the idea that they might pass on the message to their parents and friends. If people want to make a historical site acceptable for visitors, there are ways they can do that.

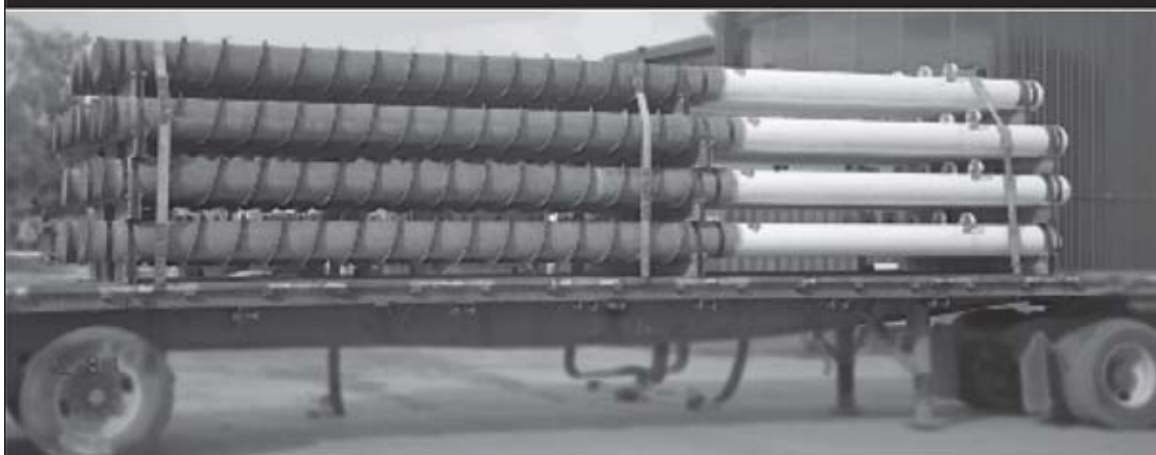
## Remediation runs into billions

There is no real estimate of remediation costs, but they probably run into the billions of dollars, according to Stone. "Suffice it to say, it's a lot more in the way of work to be done and money needed, than the money that we have." The coal mining industry pays a fee that goes into a trust fund for remediation managed by the Treasury Department, which has a balance of over \$1 billion currently. If the fee system is to continue, it must be extended by Congress, as it is set to expire soon.

For abandoned hard rock mines, BLM has a meager budget of around \$10 million. "Under our Superfund law

see REMEDIATION page 5

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• NORTHWEST TERRITORIES

# Tlicho collaborate on Colomac mine clean-up

First Nation, Canadian government remediate former open pit gold mine in NWT, contouring waste rock piles, fencing off tailings pond

By SARAH HURST  
Mining News Editor

Members of the Tlicho First Nation in Canada's Northwest Territories have played a significant role in the clean-up effort at Colomac mine, participants in the Northern Latitudes Reclamation Workshop heard in May.

Colomac is a former open pit gold mine that was operated by Washington state-based Royal Oak Mines until 1997. The company went bankrupt shortly afterwards due to the low price of gold and the Canadian government was left with the bill for reclamation, which could be up to C\$50 million.

Tlicho families have lived in the Indian Lake area, where the mine is located, for many generations, and they use the land for subsistence activities such as hunting, trapping and fishing.

A combination of traditional and scientific knowledge was used to develop a reclamation plan, George Lafferty, a Tlicho who works for the federal government's Department of Indian and Northern Affairs, said at the workshop.

The government took a group of Tlicho elders to the mine, found out what issues they were most concerned about, developed remediation goals for each issue,

reviewed the scientists' proposed options with the elders, and determined which options were preferred by the elders, which were acceptable to them, and which were not acceptable to them.

## Contoured top of rocks

Remediation goals for the waste rock piles included leaving them physically and chemically stable, promoting and enhancing revegetation and wildlife habitat, improving the appearance of the waste rock piles, and re-establishing the natural drainage between Baton Lake and Steeves Lake, which are outside the three pits.

In the end the government decided against trying to achieve the last goal, because there was too much rock in the area and the process would have cost too much.

During a three-day meeting between the government and the elders, the elders said they preferred the waste rock piles to be contoured on the top and sides, while the government's preferred option was to contour just the top. This



George Lafferty from the Canadian government's Department of Indian and Northern Affairs

was an acceptable option to the Tlicho.

Completely covering the waste rock piles was also considered, but ruled out because it was too expensive.

"To do nothing was not preferred, because the rock piles, the way they were, at the time, and the way they are now, they're not safe even for us to walk around," Lafferty said.

## Caribou pathway created

The elders also decided that a pathway for the caribou herd should be created, to keep the animals away from the mine rock area.

Additionally, an 8.5 km-long, 8 ft-high fence was put up around the tailings pond, which contains cyanide, by a mainly Tlicho crew.

"Water management is the biggest problem at Colomac which is being dealt with now, and actually the process is going very well," Lafferty said.

The cyanide in the tailings pond will be broken down by adding phosphorus, which promotes the growth of algae. The tailings pond was almost ready to overflow before the government intervened.

Once the mine buildings have been checked for hazard contaminants, they will be cleaned up and dismantled.

Remediation of the site is expected to be completed by 2010, and it will be followed by a five-year monitoring period. ●

continued from page 4

## REMEDICATION

and Clean Water Act, where we possibly can, we adhere to the polluter pays principle, which means we need to go out and see if we can identify a financially liable, responsible party to help clean up their site, or to at least contribute in part to the clean-up," Stone said. "More often than not, these sites are 100-plus years old and the chances of finding anybody who had anything to do directly with the mining are slim to none. But what we can do sometimes is find relatives who may have inherited the land over the years, or in some cases companies that have bought the land ... and more often than not we are able to at least get some in-kind contribution to the clean-up."

## Re-mining another option

Some states that have finished their work on abandoned coal mines can then use the money on hard rock mines. Another option for enticing companies to become involved with abandoned sites is the possibility of re-mining. "I think industry is willing to do this, but right now, because of Clean Water Act liabilities, in the United States if you go onto one of these sites and touch it in any way, you could be held responsible for all of the past, prior damage," Stone said. Legislation is pending, called the Good Samaritan provision, that would amend the Clean Water Act to allow new companies to come in.

Linda Billingsley, a natural resource specialist with BLM in Fairbanks, spoke at the workshop about her experiences remediating abandoned placer gold mines in Interior Alaska. "We had to clean some sites up that were in some pretty remote areas and we had to get creative, but we still wanted to maintain some fiscal responsibility," Billingsley said. Before BLM instituted its reclamation requirements in 1981, miners typically abandoned their claims, often leaving behind safety and pollution problems, she added.

"If there is a responsible party then we try to track them down and gently encourage them to help clean the site up, or to do the site clean-up completely on their own, but that's not always the case," Billingsley

said. "Because mining's happened for so long, it's often difficult to pinpoint one person that is responsible for material that was left on-site, and so BLM generally has to kick in and do the entire clean-up or push them along." BLM contracts environmental engineers if there are hazardous or potentially hazardous materials on the site.

## Three recent sites in Alaska

Three of the projects Billingsley has worked on recently are within the Steese National Conservation Area, which was set aside in 1980 to protect wildlife habitat such as caribou calving grounds. The sites are located along creeks that drain into Birch Creek Wild and Scenic River. One important task was to find and remove abandoned fuel tanks and drums. "The Steese Conservation Area gets a lot of recreation and hunting, and so we don't want to have the public near sites where they could potentially get injured," Billingsley said.

At one of the placer mining sites, along Great Unknown Creek, there were three buildings, one of which had already fallen into the creek because it was built on an eroding stream bank. Such buildings are a liability and an attractive nuisance to the public, Billingsley said. "The resource specialists in the office expressed great concern over impacts to the vegetation when we were going in, so ideally we would go in with a piece of heavy equipment and pull the buildings out, there was a bunch of fuel tanks that were downstream and we'd pull those out, but because we didn't want to cause any more damage in this conserva-

tion area, we had to look at other means."


Instead, the buildings were dismantled on-site and the materials were burned in the winter time, so there was no chance of a wildfire starting. Anything that didn't burn was pulled out by snow machine. The fuel tanks were flown out by helicopter, after the fuel in them had been pumped out. All that remained was a large sluice box, and a local resident offered to retrieve it.

BLM found buildings, vehicles, trailers, washing machines, beds, stoves and over 100 55-gallon drums at the two other sites, at Ptarmigan Gulch and Squaw Creek. Some of the drums had contents, others

were empty. Some had been shot at by people using them for target practice.

The Alaska Fire Service's smoke-jumper parachute unit at Fort Wainwright in Fairbanks offered to deliver equipment to help with the clean-up. The drums were removed from the site in winter, in special sleds with high sides on the back of snow machines. They were left by the road for four months until the snow melted and a truck could come to pick them up.

The total cost for use of the helicopter at the three sites was \$21,000, and contracting the environmental engineers was another major expense. ●




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• Y U K O N

# Brewery Creek reclamation worth a toast

Yukon gold mine one of the most northerly cyanide heap leach operations in the world; biological reclamation processes proving effective

By SARAH HURST  
Mining News Editor

Most people would expect to find Blue, Canadian, Fosters and Moosehead in their local saloon — not up in the hills that surround northern Canada's rugged Dempster Highway. But here at Brewery Creek mine, Yukon, those are some of the names of the eight small open pits that produced more than a few jugs of gold for Vancouver-based Viceroy Resource Corp. between 1996 and 2002. Brewery Creek was one of the northernmost heap leach mines in the world, and it has been the site of numerous successful technological innovations in reclamation.

Brad Thrall, chief operating officer of Alexco Resource Corp. — also in Vancouver — which took over the reclamation from Viceroy (now Quest), led a field trip to Brewery Creek during the Northern Latitudes Reclamation Workshop in May.

Viceroy mined a total of 9.5 million tonnes of ore, extracting 280,000 ounces of gold, according to Thrall.

The mine cost C\$70 million to build, plus around C\$15 million per year in operating costs and another C\$5.5 million for reclamation.

Viceroy did not come out with a profit, Thrall said. The final stage of the closure plan is a 15-year monitoring period which begins this year, and is expected to cost about C\$1.5 million.

## Site almost immaculate

Apart from the area at the mine entrance where machinery stands next to the warehouse and some small, wooden structures left over from the former 145-man camp, the site is in almost immacu-



Brad Thrall, chief operating officer of Alexco Resource Corp., oversees reclamation at Brewery Creek mine

late condition.

It has won the Yukon government's Robert E. Leckie awards for outstanding reclamation in three separate years. The shop and other buildings have been dismantled; most of the roads have been ripped up and reclaimed. The heap itself has been detoxified, recontoured and revegetated, so that a healthy grass cover

is now growing on top of it. Waste rock dumps have been resploped to 2.5:1 or flatter slopes, and the areas have been reseeded and fertilized.

Almost all of Brewery Creek's assets were sold last year and shipped to Mexico, where they are being put to use at another mine. Reagent and fuel storage facilities have been removed, and an overall site decontamination survey will take place this summer.

"The primary objective of the revegetation component is stabilization of the soil and erosion control," Thrall said. "We're trying to promote invasion of natural species, native vegetation." Poplar and willow are already growing naturally on the site.

A total of 250 ha of land has been revegetated to date, with 25 kg of seed/ha and about 300 kg of fertilizer/ha applied. The seed mix includes species such as violet wheatgrass, fowl bluegrass and tufted hairgrass.

Most of the seeding takes place in early September, and the seeds sit dormant during the winter, as conditions are often too muddy for seeding in spring.

Reclamation began while operations were still going on. For example, after the North Golden pit was mined out in 1999 it was used as a backfill for waste from

the adjacent South Golden pit. Brewery Creek finished up with just one external waste dump, as all the other waste was backfilled into open pits.

"There's a lot of benefits to concurrent reclamation," Thrall said. "It reduces your overall liability during operations and it really provides experience and research into what some of your final reclamation practices are going to be."

To prevent metal leaching from the 10 ha waste dump, a 0.5 m-deep soil cover was built over the top of it, seeded and revegetated. A large-scale lysimeter was then constructed, a device that collects soil water. "We're now monitoring the amount of precipitation that passes through this cover and we can measure that and collect it, sample and analyze for water chemistry, as well as infiltration rates, and validate the design criteria that we've established for that cover," Thrall said.

## Detoxifying the heap challenging

Detoxifying the heap was the most technically challenging and also the most rewarding part of the reclamation process, according to Thrall. "This is a cyanide operation ... in that process we not only leach and extract gold and silver, but most other metals as well. We also create compounds such as nitrate and ammonia."

In 2000, a test program was initiated to determine the most effective decommissioning method for the heap. The traditional technology used at most heap leach operations, hydrogen peroxide for cyanide destruction, was compared with a biological process that would achieve the same result. The biological process was chosen.

A carbon source was introduced into the heap, along with phosphoric acid to oxidize the ammonia. Before the process began, the ammonia level in the heap was 25 ppm and the maximum discharge level was 5 ppm.


"Over about a six to eight week period in 2002 we injected about 100,000 kg of molasses, essentially a carbon source to feed bacteria," Thrall said. "Within about a four-month period, the effluent coming off of the heap had met all the direct discharge standards. It was quite successful."

The heap has remained stable for nearly three years, and in another two years' time the government's criterion for demonstrating stability will have been met.

Lined process ponds below the heap will remain in place as a contingency measure until long-term stability has been demonstrated. As long as the solution

see BREWERY CREEK page 8





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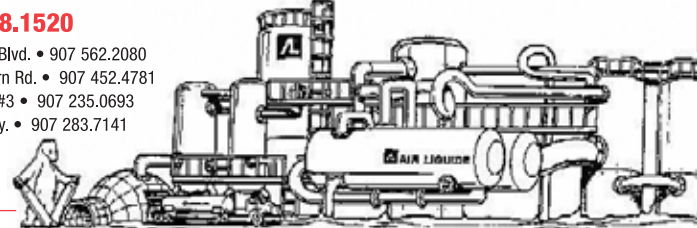
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• YUKON

# Worst is over at former Yukon asbestos mine

Creek stabilization measures, clean-up effort left waste rock and tailings, but fibers pose no significant risk to human health

By SARAH HURST  
Mining News Editor

Dawson City, Yukon epitomizes the romance of the Gold Rush, so it was a little surprising that the first field trip arranged as part of this year's Northern Latitudes Reclamation Workshop was to an extremely unglamorous site: the former asbestos mine at Clinton Creek.

Quite apart from the lack of allure of its toxic ore, the mine probably doesn't see too many visitors. To reach it from Dawson you have to cross the Yukon on a ferry, drive for almost an hour up the winding Top of the World highway, drive for another hour down a muddy mountain road, cross the Fortymile on a narrow bridge, and finally ford a small creek. It is only accessible by vehicle between May and October.

Clinton Creek mine operated in 1968-78, under the management of Cassiar Mining, which also ran its namesake asbestos mine in British Columbia.

The chrysotile (white) asbestos at Clinton Creek occurs in the serpentine ore body and its fibers can be seen forming a furry carpet on top of the rocks at the site, or sandwiched in the middle of them.

White asbestos is less likely to be inhaled than the other, more dangerous types of asbestos, but nevertheless red and white signs prominently posted around the mine site warn of the dangers of inhaling the fibers, and also of flash floods.

## Cassiar extracted 1M tonnes of asbestos

Cassiar extracted 1 million tonnes of asbestos fiber from three open pits during the life of the mine.

The company went bankrupt in 1992.

In the years when the mine was operating there was no law requiring a reclamation bond.

"In those days the word 'environment' was only just entering the vocabulary," Frank Patch, a project manager with the Yukon government's Department of Energy, Mines and Resources, told Mining News. "Mining companies are now starting to understand that clean-up is part of the cost of doing business."

The Yukon government and UMA Engineering intended to show reclamation workshop participants their newly-completed creek stabilization measures, but these were somewhat overshadowed by the 60 million tonnes of waste rock and 10 million tonnes of asbestos tailings that had reshaped the local landscape. Not to mention the 74-hectare Hudgeon Lake, which could be considered a very attractive scenic feature, except that it was created as a result of a slope failure of the waste rock dump in 1974 that blocked natural drainage through the Clinton Creek valley.

Still, the reclamation work that has

been done on the creek appears technologically efficient as well as aesthetically pleasing. Previous channel erosion control measures – large boulders and a series of small rock weirs – were unsuccessful and could provide no resistance during a major flood event in the spring of 1997, when they were destroyed altogether.

UMA designed a stable channel over the landslide dam, featuring four gabion drop structures constructed between 2002 and 2004. This should protect the creek from a full breach of the waste rock blockage, which would result in a peak discharge of approximately 500 cubic meters of water per second.

Gabion structures date back to the ancient Egyptians, who used them for bank protection along the Nile about 7,000 years ago. Originally baskets of woven reeds, they are now engineered containers manufactured from wire mesh. They are self-draining units that yield to earth movement but remain structurally sound, as opposed to rigid structures, which can fail if slight changes occur in their foundations.

The channel stabilization measures at Clinton Creek had to be able to accommodate some movements of the waste rock pile and remain functional, as the waste rock is creeping northward at a rate of 5-7 cm per year.

The drop structures here are a set of 0.5m-high steps that provide energy dissipation between each step as the water travels through and over the structure. Dewatering of the channel was required to facilitate construction, and a fish salvage operation was undertaken.

Up to 1,000 fish – mainly Arctic Grayling and Slimy Sculpins – were salvaged and returned to Hudgeon Lake or downstream reaches of Clinton Creek.

Groundwater seepage was controlled during construction by the use of granular blanket drains installed below the drop structures. The granular drains also served as foundation material in some cases.

UMA won a Consulting Engineers of Manitoba award for their Clinton Creek channel stabilization design three years ago.

## \$3 million at Clinton Creek

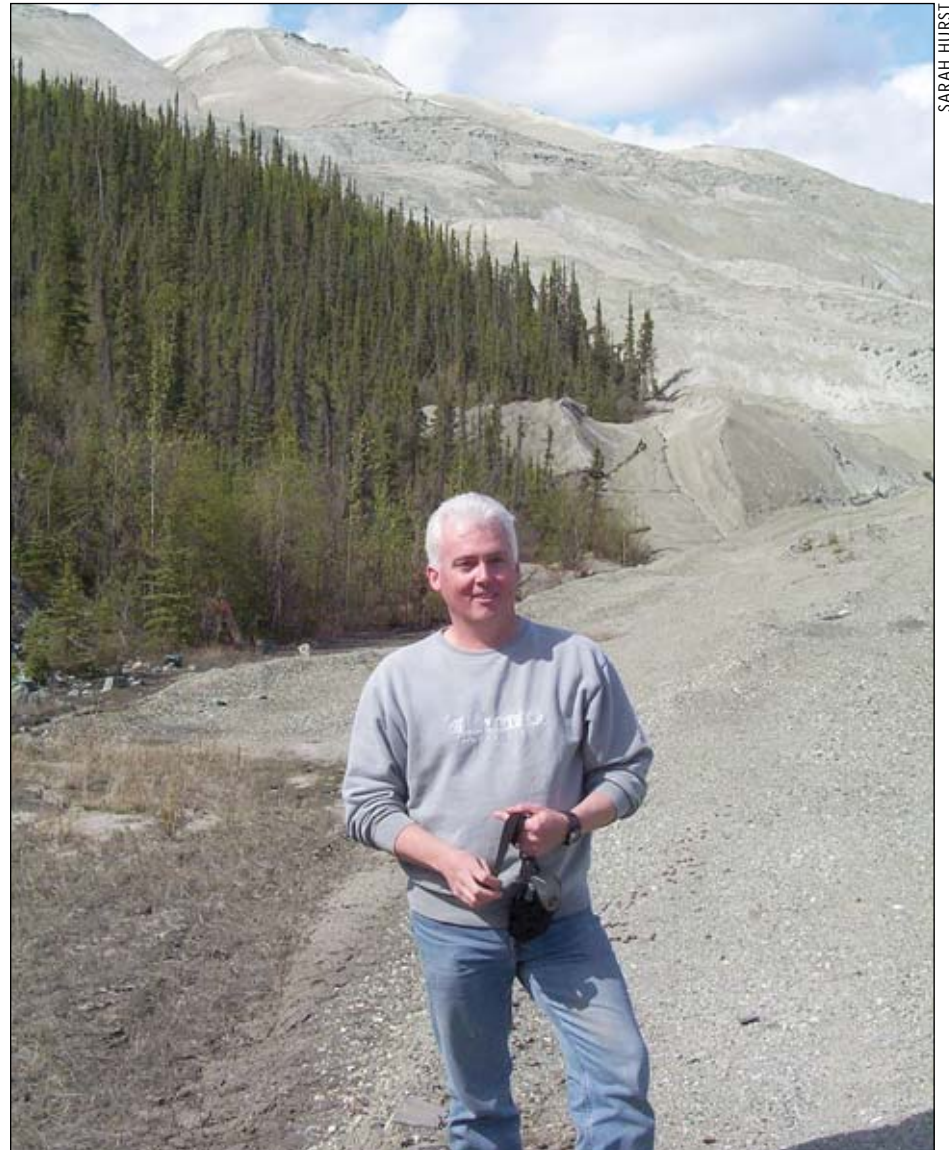
In total the Canadian government has spent about \$3 million on reclamation at Clinton Creek.

In addition to the creek stabilization, old buildings were knocked down and loose asbestos around the mill site was buried.

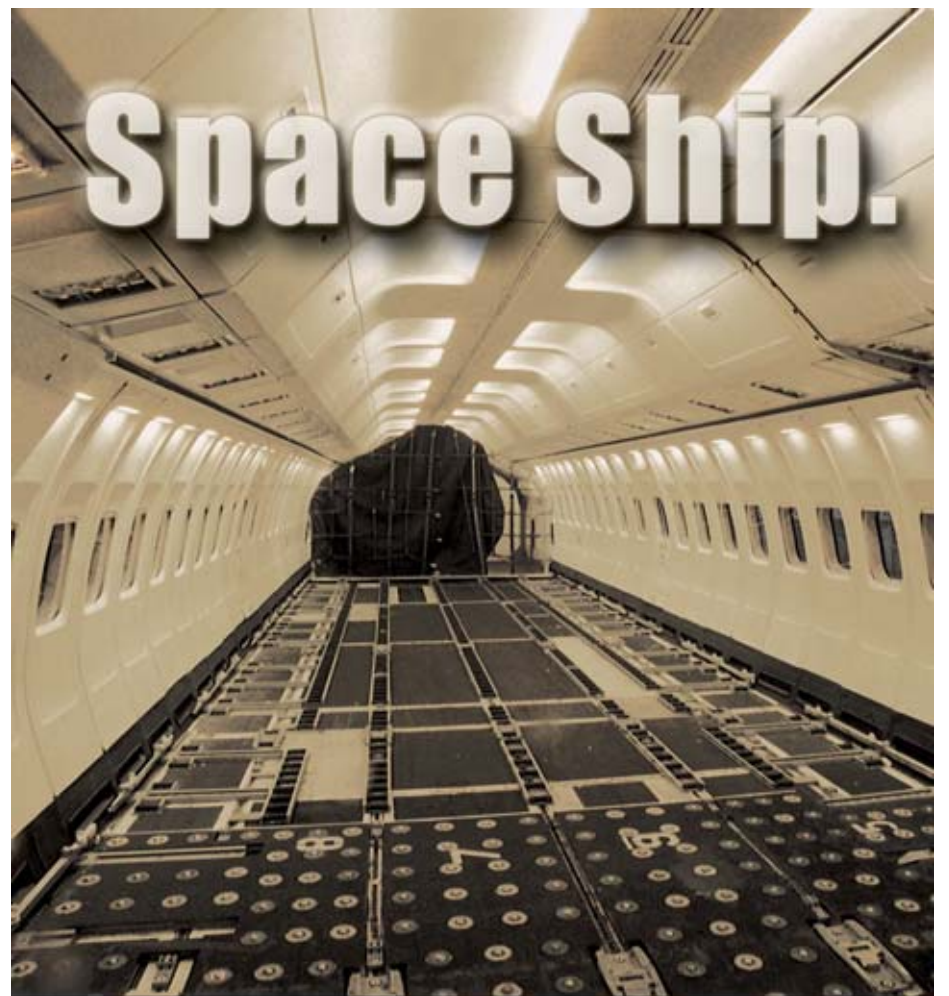
Much of the work was carried out by First Nation contractor Hän Construction from Dawson City.

UMA considered more radical reclamation plans, according to Gil Robison, a geotechnical engineer from the company's Winnipeg office. Removing all the

see CLINTON CREEK page 9



Gil Robison from UMA Engineering in Winnipeg stands in front of the asbestos tailings at Clinton Creek mine



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• YUKON

# Staff get concrete about geotechnical engineering

Training seminars at closed Faro mine help employees understand when a crack in a dam is an emergency, and when not to panic

By SARAH HURST  
Mining News Editor

Reclaiming a mine site is very different from operating a mine, and the staff involved in the reclamation may have limited experience in this kind of work.

At the former Faro lead-zinc mine in Canada's Yukon, geotechnical training has been provided so that staff understand more about the purpose of their work and the kinds of specific problems to look out for.

Jim Cassie, a geotechnical engineer with BGC Engineering in Calgary, explained the training at the Northern Latitudes Reclamation Workshop in May.

## Numerous owners before Anvil Range

Faro opened in the late 1960s and had numerous owners before coming under the management of Toronto-based Anvil Range Mining in 1996, but the company went bankrupt in 1998, with Deloitte & Touche as the interim receiver.

Deloitte & Touche oversees closure work at the mine on behalf of the federal government.

"We have a very spread-out site, we're also in different watersheds," Cassie said. "Approximately 50 million tonnes of acid-generating tailings are sitting in the bottom of the Rose Creek Valley."

Dams, dykes, berms, diversion channels, waste rock dumps, rock drains and ditches at the mine all need to be maintained.

"There are people at site that do the environmental monitoring and geotechnical surveillance program," Cassie said. "These people, of course, come from a variety of backgrounds, the ones specifically at Faro came from the processing, from the mill, some came from assaying, and some came from environmental monitoring. So if you were to look at their skill set on a piece of paper, they really have no geotechnical experience, no dam safety experience."

By contrast, at an active mine there are pit superintendents, underground rock mechanics engineers, mining engineers, geological engineers and grade control geologists who are familiar with earthworks, blasting and other geot-

technical issues, Cassie said.

One of the objectives of the training was to give reclamation staff a basic understanding of geotechnical engineering jargon.

"In addition, they need to understand how earth structures perform, and deform, and move, and crack, so that they can start to understand minor issues versus big issues, and also how these things may in fact fail, if they are going to fail, so they can understand – one, things to look for, and two, maybe how they will solve problems as they occur," Cassie said.

## Different training every year

A different training seminar for Faro staff was held each year, starting in 2001. The first one was an introduction to geotechnical issues, starting with the basics of soil mechanics, the parts of a dam, waste dumps, hydrotechnical concerns and geotechnical instrumentation.

"At Faro, for instance, we tend to deal a lot with cracks in dams," Cassie said. "Some are very minor cracks, for a variety of reasons, and other cracks are more significant, or require immediate attention."

The training enabled staff to distinguish between significant and insignificant cracks.

The seminar also taught staff about permafrost and ground ice. Although permafrost is not a big issue at Faro, it is an important concern at other northern sites.

Tailings dam failure modes were the focus of the 2002 training seminar.

The staff discussed emergency response plans and the kinds of equipment that would be used. They were shown cartoons, computer simulations and CNN clips of the different ways dams can fail.

In 2003, the seminar was about waste dump safety and monitoring, while the 2004 seminar discussed geotechnical instrumentation.

"As you can imagine, we have a rather significant suite of geotechnical instruments at the site," Cassie said. "We wanted to talk about how they work, what do they do, how do you read them, what can you do to monitor and maintain them." This year's seminar will be about seepage monitoring and weir flows.

The seminars have reduced the incidence of false alarms, because staff at Faro used to worry about every minor event.

"That's not to say that site staff are not watching, if you've met some of these site staff, they are extremely diligent about their monitoring instructions, and they have a very detailed log about every crack," Cassie said.

Staff have improved their judgment and have increased their ability to make decisions.

"Site staff really understand how important their job is, they really have a sense now ... I think we've become slightly more of a team, and that is good, that is probably the best benefit," he added.

## Breaching the fresh water supply dam at Faro

A decision was made in 2002 to breach the fresh water supply dam at Faro. The dam was constructed in 1968 as part of the original mine development, to store up to approximately 5.6 million cubic meters of water for use by the mill in winter.

It was an earthfill structure, 410 meters long and 20 meters high, built on foundations of silty sand, glacial terrace gravel and till.

There was a rip rap cover on the face of the dam, and berms were added in 1969 and 1989.

The first berm was built after seepage problems were discovered and the second berm was built to improve the dam's seismic stability. It included a granular blanket to collect seepage.

The objectives of the breach included keeping the water level within the range of natural fluctuations, getting rid of the reservoir, controlling sediment releases and providing fish passage for up to a one-in-10-year flood.

The water level in the reservoir behind the dam was lowered by about 6 meters in summer 2003 and revegetation of the upper part of the reservoir was initiated.

Once Canadian and Yukon government agencies had issued approvals for the breach project, the excavation of the dam breach began on Nov. 11, 2003, and dam removal was completed on Dec. 16 that year.

Post-decommissioning monitoring has commenced and will continue for several years.

The Faro dam was the second-highest dam at the time that had ever been breached.

The cost was around \$3 million. BGC Engineering designed the breach and Pelly Construction of Whitehorse was contracted to do the work. ●



Jim Cassie, a geotechnical engineer with BGC Engineering in Calgary

SARAH HURST

continued from page 6

## BREWERY CREEK

from the heap meets the criteria in the water license, it can be discharged directly into the environment. If there is an upset in the heap chemistry, the solution can be collected.

The heap is divided into seven cells and if one area of the heap causes prob-

lems, the water from it can be segregated and stored in a pond. As an additional precaution, a conventional chemical treatment system has been installed, although it has not been needed yet.

One of the big tasks completed last year was the removal of five culverts along the haul road, which entailed the excavation of about 80,000 cubic meters of material and the construction of five 1 m-deep rip rap channels, designed for

one-in-200-year floods.

On a hot spring day it is hard to imagine water ever flowing over these dry rocks, but the reclamation at Brewery Creek is all about contingencies, no matter how remote they may be.

The objectives of the reclamation plan, according to Thrall, are to protect public health and safety, prevent and minimize environmental effects, and facilitate a passive walkaway closure

strategy. This is the dream of all mining companies, meaning that an end to the reclamation process can be established and there is no need to do water treatment in perpetuity.

"A major hurdle in this was really overcoming that mindset that it's difficult to do biological processes in the north," Thrall said. "Biological and bacterial type processes are very effective in northern type conditions." ●

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• NORTHWEST TERRITORIES

# Impact of diamond mining will not be forever

De Beers established a detailed closure, reclamation plan for Snap Lake mine in Canada's Northwest Territories before construction

By SARAH HURST  
Mining News Editor

The right way to do mine reclamation is to start planning it before the mine opens, and long before it closes.

That's exactly what is happening at the site of De Beers' proposed Snap Lake diamond mine in Canada's Northwest Territories. The company's board recently approved the project and production is scheduled to start in 2006. Snap Lake will be De Beers' first diamond mine outside Africa and Canada's first fully underground diamond mine.

The construction cost will be an estimated C\$636 million.

"I forget that sometimes, when I'm working with De Beers, that they're doing a mining project, not a revegetation project, but I also think it's good to stress that that's my focus and remind them of that," Sandra Marken, a plant ecologist with Golder Associates in Calgary, said at the Northern Latitudes Reclamation Workshop in May.

"Right now this is a plan that I'm presenting; we don't have any data, we haven't started revegetation, but there's things we can do up front that will help them down the road, in five, 10, 15, 20 and 25 years that will expedite the reclamation process," Marken said.

## Switching to QuickBird satellite technology

Marken and her team used Landsat to map the vegetation, and they identified 18 vegetation cover types in the vicinity of the proposed mine. Heath-boulder and open water accounted for 85 percent of the area's vegetation.

Another 12 percent consisted of open spruce forest or tussock hammock, and various different vegetation types made up the remaining 3 percent.

Landsat did not provide a high enough resolution for the team's purposes, so this summer they will be switching over to the QuickBird satellite technology.

The focus of the reclamation will be at the north pile, a processed kimberlite and waste rock storage facility, Marken said.

The north pile, the mine buildings, the access road and the airstrip will form the footprint of the project.

**Over the 22-year mine life it will be developed in three stages, and each stage, or cell, will be capped with half a meter of crushed granite, which will control erosion, but will also create some vegetation challenges.**

The environmental impact assessment and monitoring program have so far looked at a 500-meter buffer around this footprint. The project's total area of impact is approximately 560 ha.

The north pile will be 484 meters wide, 1,200 meters long, 92 ha in area and rise 39 meters above the lowest local point, while not exceeding the height of the highest point.

Marken said that over the 22-year mine life it will be developed in three stages, and each stage, or cell, will be capped with half a meter of crushed granite, which will control erosion, but will also create some vegetation challenges.

After three years, reclamation will begin on the north pile's first cell.

"There has been some discussion with local communities as to whether they want to revegetate it at all, because of some concerns about plants growing on kimberlite, the possibility of accessing contaminants," Marken said. "In the planning of this north pile, it doesn't look like that will happen, however, we will monitor it to make sure it doesn't."

## EIA's predictions tested annually

Work on the environmental impact assessment for the mine began in 1992 and it was approved in 2002.

The government's water license requirements added to the lengthy list of measures that De Beers has to implement in order to protect the environment.

The environmental impact assessment's predictions must be tested annually, to show the government and stakeholders that they are accurate, and that nothing unexpected is happening.

"We may have changes beyond the footprint that are affecting vegetation patterns, so we'll be measuring that every year, as well," Marken said. "We'll also be monitoring annually the results of reclamation and we'll also be applying adaptive management for continual improvement."

## Two forms of monitoring

There will be two forms of monitoring, the annual monitoring and additional monitoring precipitated by predetermined triggers that signal potential problems – an early warning system.

If annual monitoring shows that the mine is disturbing more land than originally planned, or if the soil chemistry or water quality is different from the expected levels, that will trigger a site visit and possibly more investigation, and a more detailed monitoring program.

The other trigger program is the impact of dust, which is triggered by the annual air

monitoring program.

After the environmental impact assessment was complete, a closure and reclamation plan was developed.

"It is a living document ... we'll expect changes as we go, and it'll also become more detailed as the program progresses," Marken said. "Right now a lot of our revegetation plans feel a little hypothetical."

## Sharing information with other northern mines

De Beers and the reclamation specialists have committed to collaboration with other northern mines, to study changes to vegetation and soil properties if necessary, to monitor the effects of dust on vegetation, to incorporate traditional land use and knowledge in their program, and to train and work with local aboriginal communities. They will be exchanging information with BHP Billiton's Ekati diamond mine, also in the Northwest Territories.

Northwest Territories laws require De Beers to establish stable landforms, protect local water resources, re-establish productive use of the land, and facilitate the natural recovery of areas affected by mining. All of this is provided for in the closure and reclamation plan.

"Down the road, five, 10, 15, 20 years, if we want to find out if the mine is having an effect, or if we suspect it does, we'll have this pre-mine data to compare that back to, and I think we're fortunate to be able to do that," Marken said. ●

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continued from page 7

## CLINTON CREEK

waste rock and restoring the valley would have cost over C\$30 million, he said.

The grey mountain of tailings is an eyesore, but not a health hazard. Monitoring has shown that the amount of asbestos in the air does not pose a significant risk.

Robinson joked that the tailings pile would make a great spot for snowboarding. A protective crust has formed on top of it, and if any attempt were made to move the tailings, the crust would be disturbed and dust would be released.

Another surprising benefit of the crust, recently discovered, is that it absorbs carbon dioxide, thanks to the magnesium cations (positively charged ions) in it. In theory the Clinton Creek mine could earn credits for reducing greenhouse gases.

Which goes to show that every cloud has a silver lining, or at least a magnesium one. ●

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• A L A S K A

# Another Kuskokwim Delta gold hunt

Native regional corporation signs lease with California mining company seeking to explore 57,600 acres in Nyac District

By ROSE RAGSDALE

Mining News Contributing Writer

**T**onogold Resources Inc., a California junior mining company, is mounting a gold exploration campaign in Alaska's Kuskokwim River Delta this summer not far from the city of Bethel. The move marks Tonogold's first exploration venture in Alaska and the second gold project in the Kuskokwim delta in recent years.

La Jolla-based Tonogold came to Alaska looking for an affordable "company-making property" and wound up signing a 10-year mining lease last month with Calista Corp. to explore the 57,600-acre Nyac gold district about 60 miles east of Bethel, and 300 miles west of Anchorage, company President Jeff Janda said June 10.

## Native corporations impressive

"We decided early on to work with the Alaska Native corporations. They seemed to have the best lands, 44 million acres in all," Janda said. "We talked with a number of them, including Doyon (Ltd.) and Bering Straits (Corp.) as well as Calista. We were impressed with them because they really have their act together. But we especially liked Calista. They were easy to work with and their land department is composed of geologists."

Janda said a comprehensive master's thesis on the Nyac District caught the eye of Tonogold geologists in reviewing Calista's portfolio of mining properties.

Historical production in the Nyac District totals more than 500,000 ounces of gold, from 1908 to the present day, but the lode source has never been identified. The current placer operator is Tuluksak Dredging, Ltd.

Prepared by a University of Alaska Fairbanks student for Calista, the report



Jeff Foley, a Calista Corp. senior geologist, discusses positioning devices with Tonogold Resources senior project geologist Don Strachan.

theorized that Nyac's location on four drainages suggested that its plentiful placer gold traveled a short distance, which bodes well for finding the district's lode source.

## Another Donlin Creek?

Located on the Tuluksak River in the Kilbuck Mountains within the southwestern extension of the recently recognized Tintina Gold Belt, the Nyac district is about 130 miles from the Donlin Creek gold prospect currently being developed by Placer Dome.

**"Calista told us, 'If we're going to find another Donlin Creek, we think it's at Nyac.' That kind of got us excited, and when we found that Calista was spending (its) own money to explore Nyac, that got us really excited." - Tonogold President Jeff Janda**

"Calista told us, 'If we're going to find another Donlin Creek, we think it's at Nyac,' " Janda said. "That kind of got us excited, and when we found that Calista was spending (its) own money to explore Nyac, that got us really excited."

Calista geologists have been working at Nyac since the 1980s, "which is one reason Tonogold was so comfortable with us," said Vice President of Lands and Resources June McAtee.

Calista sampled the Wallace gold

exploration status as quickly as possible. The company has earmarked \$431,000 for 2005 field work, including mapping the area and taking 4,000 surface geochemical samples to identify drill targets. Tonogold plans to seek an exploration permit to begin drilling next year.

## Calista may buy in to Nyac project

Several Calista shareholders are currently training to work on the field team this summer. Janda said he and his colleagues thought the logistics of fieldwork in Alaska this summer would tough, but Calista subsidiary Chiulista Camp Services made it easy.

Tonogold also has three gold and silver projects under way in Nevada.

The Nyac lease includes a buy-in option for Calista to acquire equity in the project at some future date, according to McAtee. The lease also provides for a yearly advance royalty payable to Calista, minimum annual work requirements, a net smelter royalty when in production and an annual \$5,000 scholarship contribution to the Calista Scholarship Fund. ●



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