



Northern Oil and Gas Annual Report 2003

The management of oil and gas resources on Crown lands north of 60° N. latitude in the Northwest Territories, Nunavut and the northern offshore is a federal responsibility carried out by the Northern Oil and Gas Directorate of the Department of Indian Affairs and Northern Development.

Petroleum resources management on Crown lands is exercised under federal legislation. *The Canada Petroleum Resources Act* and its regulations govern the granting and administration of Crown exploration and production rights and set the royalty regime. *The Canada Oil and Gas Operations Act* governs the regulations of petroleum operations and associated benefits requirements. Land, royalty and benefit matters are managed by the department on behalf of the Minister of Indian Affairs and Northern Development while the National Energy Board takes the lead role in approval of operations.

Information on the northern oil and gas regime may be found on the web at: <http://www.ainc-inac.gc.ca/oil>



Published under the authority of the
Honourable Andy Mitchell, P.C., M.P.
Minister of Indian Affairs and Northern Development
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Message from the Honourable Andy Mitchell, P.C., M.P.
Minister of Indian Affairs and Northern Development

Canada's North is poised to become a key supplier of secure energy to North American markets for years to come. Oil and gas activity is back in the North, with exploration companies having already spent nearly \$1 billion over the last five years, and we are encouraged by their plans to extend exploration activity into the future.

The development of the North's oil and gas resources will generate important economic, fiscal and social benefits to the territories, and have positive effects on production, employment, and income. Development will also be greatly enhanced by building a gas pipeline to Canada's Arctic. The government of Canada is responding to increasing oil and gas activity by investing in scientific research to educate and raise awareness among Canadians that development will not occur at the expense of our environment.

Northern sustainable economic development is a shared federal-territorial responsibility, in partnership with Aboriginal organizations, industry, and other key players. Northerners and Canadians from coast to coast to coast will benefit from an improved northern economy.

I am pleased to report that overall activity levels by the oil and gas sector in the North were generally sustained through 2003 and continued to provide employment and business opportunities to remote communities in the North, as well as rewarding industry with a number of exploration successes.

I invite you to consult this report for details on the exploration and development of Canada's northern oil and gas resources over the past year.

In accordance with section 109 of the Canada Petroleum Resources Act, I am pleased to table before Parliament this annual report on the administration of oil and gas in the Northwest Territories, Nunavut and the northern offshore for the year ending December 31, 2003.

May 5, 2004

Canada's Frontier Lands



 Area under the responsibility of the Minister of Indian Affairs and Northern Development

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NORTHERN OIL AND GAS ACTIVITIES

Highlights

This year saw a burst of drilling activity in the southern Northwest Territories underlining the potential for sustained interest by the oil and gas industry in this region. Further north, exploration efforts in the Colville Hills area of the central Mackenzie Valley were encouraging. Of note, was the announcement of two successful gas wells on private Sahtu lands owned and managed by Aboriginal people. This bodes well for future activity leading towards development.

The announcement of a gas discovery resulting from the renewed drilling effort in the Mackenzie Delta points to the immense potential of this region to sustain and build gas flows through a future Mackenzie Valley gas pipeline. The pipeline came one step closer to realization with the June release of the *Preliminary Information Package* for a Mackenzie Gas Project conceived by a consortium of oil and gas companies. This plan is serving to prime the regula-

tory process in anticipation of a future application.

Development drilling on two fields in the southern Northwest Territories saw the return of one gas field to production and the start-up of new oil production at Cameron Hills. At year-end gas was being produced from six gas fields and oil from two oil fields north of 60. Major volumes of oil continued to flow into Alberta through the Enbridge Pipeline from Norman Wells, still one of the leading Canadian oil fields in terms of remaining resources. Gas was flowing from five fields in the Northwest Territories through three trans-border pipelines into Alberta and British Columbia. New oil from Cameron Hills was mingled with gas in a pipeline running from the Cameron Hills in the southern Northwest Territories to northern Alberta. Although overall production volumes were somewhat down over last year, royalty receipts climbed significantly, thanks to high commodity prices.

Oil and gas fundamentals and significance for northern operations

Average prices for natural gas during 2003 were nearly double the previous year with the average Alberta contract price remaining above \$5 per gigajoule (GJ) with the monthly average for March reaching \$8.45. Prices were sustained throughout the summer by efforts to rebuild storage levels after the preceding winter. The Alberta market closed the year with prices rising above the \$6 level into 2004.

Oil prices also remained relatively high throughout the year. The average price of Ca-

nadian crude at Edmonton averaged \$274.1 per cubic metre (m³) for the year, eight percent higher than 2002. With oil prices remaining relatively high there was less incentive through the year for consumers to switch from natural gas thus keeping gas demand and prices high.

The 2003 drilling season in western Canada is expected to have set a record for number of wells drilled (Canadian Association of Drilling Contractors, news release October 20, 2003). Drilling appears to remain over-

whelmingly gas-directed but the increased number of wells is largely due to wells being drilled to shallow targets with smaller reserves. These require less time to drill and cost less. In the face of this frenetic activity, the potential for discovery and development of larger gas pools in the North is increasingly attractive despite higher individual well costs.

Despite increased drilling and domestic demand Canadian natural gas production declined 3.8 percent from the previous year with exports to the United States declining by 5.8 percent (Statistics Canada, *The Daily*, February 2004). This decline contrasted with an overall increase in oil production, mainly from increasing oil sands development in Al-

berta. Increasing demand for natural gas for oil sands development will remain a factor in supporting gas prices in western Canada where most northern gas production is sold.

The 2003 report by the National Energy Board (NEB) *Canada's Energy Future - Scenarios for Supply and Demand to 2025* anticipates production from a Mackenzie Valley pipeline system by 2010 with expansion as early as 2015. By 2025 the North should be supplying between 10 and 15 percent of Canada's gas production, if the pipeline proceeds on schedule. However, the NEB report also pointed to significant uncertainty regarding discoveries of new natural gas supplies to take the place of declining production from the Western Canada Sedimentary Basin over the next two decades. Both conventional gas from frontier regions and unconventional supply (such as Coal Bed Methane) entails greater uncertainty. A drive to diversify supply options in response to such uncertainty is facilitated by prices sustained at today's levels, and should certainly include enhanced investment in northern exploration and development.

Commodity prices

	January 2003	December 2003	Average 2003
Oil — C\$ per m ³ (average at Edmonton)	316.65	259.33	274.10
Gas — C\$ per GJ (average AECO)	6.04	5.32	6.31

Source: Natural Resources Canada

Oil and Gas Resources

Canada's Northwest Territories, Nunavut, and Arctic Offshore host an estimated 33 percent of Canada's remaining conventionally recoverable resources of natural gas and 25 percent of the remaining recoverable light crude oil (Drummond Consulting, 2002 — unpublished report).

Potential natural gas resources are roughly split between the Northwest Territories (2.3×10^{12} m³ or 82 trillion cubic feet — tcf) and Nunavut (2.0×10^{12} m³ — 71 tcf). (These num-

bers include the portion lying beneath offshore waters adjacent to the territories.) The Northwest Territories has an ultimate potential for crude oil estimated at 0.9×10^9 m³ (5.7 billion barrels) and Nunavut has a potential of 0.43×10^9 m³ (2.7 billion barrels). Northern regions proven to be rich in both discoveries and potential are the Beaufort Sea-Mackenzie Delta Basin, the Sverdrup Basin of the Arctic Islands, the central Mackenzie Valley, and the Liard Basin in the southern Northwest Territories. While all these regions have

Discovered resource inventory

Region	Crude oil 10 ⁶ m ³	Million barrels	Natural gas 10 ⁹ m ³	Trillion cubic feet
Northwest Territories	70.5	(443)	178.3	(6.3)
Nunavut	0.9	(6)	190.7	(6.7)
Arctic Offshore	193.0	(1214)	506.5	(17.9)
Total	264.4	(1663)	875.5	(30.9)

Compiled from several published sources which may underestimate or overestimate actual field resources.

good potential and have seen significant exploration and discovery, they remain underexplored.

Although remote from most existing production infrastructure, the most accessible of these potential resources lie between the border with the provinces at 60 degrees north (60°N) and the Beaufort Sea in a broad corridor running between the Rocky Mountains and the Canadian Shield. This region, comprising much of the Northwest Territories and adjacent Arctic offshore, is estimated to contain 49 percent of the recoverable gas and 58 percent of the oil in northern Canada with the Beaufort Sea-Mackenzie Delta Basin by far the largest potential contributor.

North of 60, the southern Northwest Territories is currently the largest producer of natural gas and the Norman Wells oil field in the central Mackenzie Valley continues to be the major oil producer. In the Beaufort Sea-Mackenzie Delta Basin, major gas fields at Taglu, Parsons Lake, and Niglintgak are the expected anchor fields for the Mackenzie Valley gas project. Some 50 other discov-

eries in this basin have potential for subsequent development, including Amauligak, a major offshore discovery of both oil and gas. The Mackenzie Delta also has potential non-conventional natural gas resources in the form of natural gas hydrates. Large accumulations of hydrate exist beneath the permafrost on the Mackenzie Delta: these hold quantities of methane estimated to greatly exceed the conventional natural gas potential in the basin. Gas hydrates have been the object of a multi-year international scientific investigation. While this resource has yet to be proven commercially viable, recent research at the Mallik well site is assessing the production potential.

Although not currently under consideration for conventional development because they are so remote, resources in the Arctic Islands are comparable in natural gas potential to the Beaufort Sea-Mackenzie Delta region. The most promising discoveries are those in the Sverdrup Basin, where past exploration efforts have proven the existence of major gas fields at Drake Point and nearby Hecla with combined resources of 182 × 10⁹ m³ (6.5 tcf).

OIL AND GAS MANAGEMENT

Rights Issuance

The department provides industry with an annual opportunity to obtain exploration rights in the Northwest Territories and areas of Nunavut and the northern offshore. The exploration rights are made available on terms prescribed under the *Canada Petroleum Resources Act* and supported by northerners.

A Call for Nominations has preceded each Call for Bids. The Call for Nominations enables industry to specify blocks of land that are of interest. The Department of Indian Affairs and Northern Development consults with Aboriginal groups to ensure that their views are considered in the rights issuance process.

Crown rights are issued pursuant to an open, competitive bidding process. A single bid evaluation criterion is used to determine the successful bidder. Typically, the criterion is the dollar value of the work pro-

posed during the first period of the licence. A work requirement for one well to be drilled during the first period of the licence in order to continue the licence to the second period is also a typical condition.

In accordance with the provisions of land claims settlement agreements, the department seeks the views of Aboriginal communities and organizations prior to rights issuance on the terms and conditions of the issuance and related matters. The department is also working towards establishing measures that would meet the needs and provide economic opportunities for those areas without a land claim settlement, primarily in the southern Northwest Territories.

Calls for Nominations were launched late in 2002 with closing dates in December 2002 and January 2003 for three areas, that is, the

Exploration licences issued as a result of Calls for Bids

Region	Number and date of licences issued	Licence time-limit (in years)
Southern NWT (Fort Liard)	8—Jan. 1995	7 (4+3)
	6—April 1996	7 (4+3)
Central Mackenzie Valley	8—May 1995	9 (5+4)
	6—Mar. 1996	9 (5+4)
	7—May 1997	8 (4+4)
	6—Aug. 2000	8 (4+4)
	5—Sept. 2001	8 (4+4)
	1—May 2003	8 (4+4)
Beaufort Sea/Mackenzie Delta	4—Sept. 1999	9 (5+4)
	9—Aug. 2002	9 (5+4)
	2—May 2002	9 (5+4)

Central Mackenzie Valley, the Beaufort Sea-Mackenzie Delta, and Arctic Islands of Nunavut and surrounding offshore areas.

On January 07, 2003, the Call for Nominations for the Beaufort Sea-Mackenzie Delta area closed and no nominations were received. Nunavut's Arctic Islands Call for Nominations closed on January 14, 2003 and again, no nominations were received. The Central Mackenzie Valley Call for Nominations which closed in December 2002, received one nomination. The parcel

was posted in the subsequent Call for Bids which closed on May 27, 2003. On May 28, 2003, the successful bidder was announced and exploration licence number 421 (EL421) was issued.

At calendar year-end (2003) we were waiting for the January 30, 2004 close of nominations for the three northern areas. Any parcels nominated would be subject to a Call for Bids launched in early February which would remain open for the statutory minimum of 120 days.

Land disposition (in hectares)

Region	Exploration licences	Production licences	Significant discovery licences	Total
Arctic Islands	0	1,224	332,882	334,106
Beaufort Sea	745,467	16,618	171,450	933,535
Eastern Arctic Offshore	931,640	0	11,184	1,805,324 ^{1*}
Hudson Bay	0	0	0	126,376 ^{2*}
Mackenzie Delta	1,006,233	2,506	109,937	1,118,676
Mackenzie Valley	1,796,187	31,271	83,401	1,939,650 ^{3*}

*Former Permits and/or Pioneer Leases.

1 Includes 862,500 hectares in restricted area/under former rights.

2 Includes 126,376 hectares in restricted area/under former rights.

3 Includes 28,791 hectares under former rights.

Land disposition interest type

Region	Exploration licences	Production licences	Significant discovery licences	Former rights*
Arctic Islands	0	1	20	0
Beaufort Sea	3	1	31	0
Eastern Arctic Offshore	1	0	1	30
Hudson Bay	0	0	0	8
Mackenzie Delta	12	1	34	0
Mackenzie Valley	23	16	29	17

*Former Permits and/or Pioneer Leases.

Interests Issued in 2003

One new exploration licence was issued as a result of a successful Call for Bids in the Central Mackenzie Valley, EL421 to Canadian Forest Oil Ltd.

A significant discovery licence was issued to Paramount (SDL122) in the Fort Liard area, southern Northwest Territories from the lands formerly held un-

der exploration licence EL369.

Two additional production licences (PL 017 and PL018) for the Cameron Hills area of the Northwest Territories were issued to Paramount Resources Ltd. These two brought to six the number of production licences issued for the Cameron Hills area in the last two years.

Administration of Interests

Exploration licences

There were 40 exploration licences active at the end of 2003. This includes those exploration licences for which significant discovery licences have been applied pending the National Energy Board's (NEB) decision or decisions on the application for significant discovery declaration(s) (SDD) based on the exploratory work conducted. The NEB reviews the data submitted by the applicant in support of its application for the SDD.

Each exploration licence issued as a result of a Call for Bids, requires the interest holder to submit 25 percent of the work expenditure bid as a deposit. Tenure to Period 2 of the term

requires the completion of a well in Period 1. During Period 2 of the term, rentals are paid.

Both the work deposit required for Period 1 and the rentals in Period 2 are refundable upon completion and approval of the work undertaken on the licence. Administration of the deposits includes the application of the allowable expenditures which are submitted as exploratory work is completed. Deposit administration is ongoing throughout the year as new deposits are received for the rentals due in Period 2 and/or amendments are made with respect to those already in the system.

Security deposits being administered

Refundable work deposits of Period 1 (refunded at 1 for each \$4 spent) = **\$173 million ±**

Refundable rentals of Period 2 (refunded at 1 for each \$1 spent) = **\$11 million ±**

Benefits

The oil and gas sector continued to demonstrate its potential to become an important component of the northern economy. Substantial levels of exploration and development activity near Fort Liard and in the Cameron Hills and, to a lesser extent, in the Mackenzie Delta

and central Mackenzie Valley have created significant employment, training, and procurement opportunities for northerners and northern firms. The Colville Lake area continued to see significant oil and gas exploration activity. In particular, Fort Liard has experienced high

Exploration licences

Licence number	Land area (in ha)	Representative ¹	Issue date (y.m.d)	Well to be drilled by (y.m.d)		Expiry date (y.m.d)	Work bid amount (in \$)
Eastern Arctic Offshore							
EL297 ²	931,640	CanNat Resources Inc.	1998.07.14	2007.07.14		2007.07.14	
Beaufort Sea/Mackenzie Delta							
EL317 ³	175,810	Talisman Energy Inc.	1986.10.05	n/a		n/a	n/a
EL329 ³	349,982	BP Canada Energy Res.	1987.09.05	n/a		n/a	n/a
EL384 ⁴	86,685	Encana West Ltd.	1997.01.06	2006.01.05		2006.01.05	—
EL385 ⁴	128,327	Encana West Ltd.	1997.01.06	2006.01.05		2006.01.05	—
EL393	72,474	Burlington Resources Can.	1999.09.18	2004.09.17		2008.09.17	35,550,000.00
EL394	73,155	Burlington Resources Can.	1999.09.18	2004.09.17	√	2008.09.17	42,375,000.00
EL403	75,650	Shell Canada	2000.08.15	2005.08.14		2009.08.14	35,000,000.00
EL404	73,608	BP Canada Energy Res.	2000.08.15	2005.08.14		2009.08.14	76,675,288.00
EL405	76,307	Petro-Canada	2000.08.15	2005.08.14	√	2009.08.14	46,454,620.66
EL406	72,523	Petro-Canada	2000.08.15	2005.08.14	√	2009.08.14	81,876,595.88
EL407	71,515	Anadarko Canada Corp.	2000.08.15	2005.08.14		2009.08.14	2,421,350.84
EL417	18,912	Chevron Canada	2002.05.14	2007.05.13		2011.05.13	13,200,000.00
EL418	37,436	Devon ARL Corp.	2002.05.14	2007.05.13		2011.05.13	1,100,000.00
EL419 ⁵	147,822	Petro-Canada	2002.04.18	2004.09.17	√ ⁷	2008.09.17	105,293,760.00
EL420 ⁵	338,469	Devon ARL Corp.	2002.08.15	2005.08.15		2009.08.14	224,069,655.56
Mainland — Southern Northwest Territories							
EL365 ⁶	20,635	Canadian Forest Oil Ltd.	1995.01.23	1999.01.22	√	2002.01.22	1,500,000.00
EL369 ⁶	25,737	Paramount Resources	1995.01.23	1999.01.22	√	2002.01.22	8,765,580.00
EL380 ⁶	25,606	Canadian Forest Oil Ltd.	1996.04.10	2000.04.09	√	2003.04.09	2,200,000.00
EL381 ⁶	15,422	Paramount Resources	1996.04.10	2000.04.09	√	2003.04.09	6,250,000.00
EL382 ⁶	25,335	Paramount Resources	1996.04.10	2000.04.09	√	2003.04.09	1,100,000.00
EL383 ⁶	25,515	Paramount Resources	1996.04.10	2000.04.09	√	2003.04.09	1,224,400.00
Mainland — Central Mackenzie Valley							
EL373	99,560	Devlan Exploration	1996.03.27	2001.03.26	√	2005.03.26	1,226,000.00
EL374	139,890	Devlan Exploration	1996.03.27	2001.03.26	√	2005.03.26	1,042,000.00
EL386	117,650	Devlan Exploration	1997.05.05	2001.05.04	√	2005.05.04	1,072,000.00
EL391	31,967	Northrock Resources Ltd.	1997.05.05	2001.05.04	√	2005.05.04	4,000,000.00
EL392	23,652	Encana West Ltd.	1997.05.05	2001.05.04	√	2005.05.04	8,466,460.00
EL397	134,565	Northrock Resources Ltd.	2000.08.01	2004.07.31		2008.07.31	16,580,000.00
EL398	133,480	Encana West Ltd.	2000.08.01	2004.07.31		2008.07.31	1,000,000.00
EL399	120,496	Apache Oil	2000.08.01	2004.07.31		2008.07.31	8,400,000.00
EL400	118,060	Cdn Natural Resource Ltd.	2000.08.01	2004.07.31	√	2008.07.31	17,500,000.00
EL401	128,584	EOG Resources Can. Inc.	2000.08.01	2004.07.31	√	2008.07.31	12,750,000.00
EL402	128,718	Devon ARL Corp.	2000.08.01	2004.07.31		2008.07.31	1,243,789.00
EL412	68,772	Canadian Forest Oil Ltd.	2001.09.18	2005.09.17		2009.09.17	1,867,911.00
EL413	80,464	Devlan Exploration	2001.09.18	2005.09.17		2009.09.17	2,000,000.00
EL414	84,880	Apache Oil	2001.09.18	2005.09.17		2009.09.17	10,750,000.00
EL415	83,216	Hunt Oil	2001.09.18	2005.09.17		2009.09.17	1,260,000.00
EL416	80,510	Northrock Resources Ltd.	2001.09.18	2005.09.17		2009.09.17	1,526,430.00
EL421	79,668	Canadian Forest Oil Ltd.	2003.05.28	2007.05.28		2011.05.28	1,108,650.00

¹ These representatives are current to date of draft i.e. March 2004.

² Amended per s. 26(4) of the CPRA, originally issued pursuant to the Canada Oil and Gas Land Regulations.

³ Under work prohibition orders.

⁴ Land exchange for Cape Bathurst former permits.

⁵ Consolidation per s. 25(3) of the CPRA.

⁶ Continued in force pursuant to s. 27 of the CPRA.

⁷ Note that on consolidated licences, one well may not be sufficient to hold all lands in the licence, depending on the terms of consolidation.

√ Well requirement met as of year-end. The drilling of one exploratory or delineation well prior to the end of Period 1 of the term is a condition precedent to obtaining tenure to Period 2.

levels of employment and business contracting as a result of continued and new oil and gas exploration and development. Although exploration activity has decreased, northerners and northern firms have continued to respond positively and benefit from the opportunities arising from oil and gas activity. When oil and gas exploration and development are undertaken in northern Canada, the proponent must ensure full and fair access to employment, training, and business opportunities for northerners and northern businesses, and give first consideration to qualified individuals residing in regional communities. The seasonal nature of employment fits well with the dual aspects of the traditional and wage economy of many communities.

In 2001, the department's Yellowknife-based Petroleum Development Division assumed the lead responsibility for the administration of benefits plans in the Northwest Territories, and has continued working closely with the Northern Oil and Gas Directorate to complete the transition. Division staff continued to meet with the Inuvialuit, First Nations, and northern communities to better understand their benefits issues and concerns and to increase public understanding of the *Canada Oil and Gas Operations Act (COGOA)* benefits plan requirement. The Petroleum Development Division has also begun to play a greater role in rights issuance consultations with affected northern communities.

Environmental Considerations

Consultations

Before issuing a Call for Nominations, consultations are held with northern Aboriginal groups to identify areas of environmental sensitivity, including ones holding special interest for cultural or spiritual reasons. The Department of Indian Affairs and Northern Development also consult with other federal departments and territorial government agencies. Environmental considerations play an important role when issuing land use permits, water licences, and all work authorizations. The terms and conditions of a Call for Nominations and Bids reflect the results of this consultation process.

Environmental Studies Research Funds (ESRF)

Under the *Canada Petroleum Resources Act*, the ESRF finances environmental and so-

cial studies related to the exploration and development of oil and gas resources on frontier lands.

Continuing with the resurgence of oil and gas activity in the North, as well as forecasting the need for continuing state of the art research, the ESRF Management Board continued their study program for 2003, funded by a levy agreed to by industry representatives and approved by the minister. Funds raised totalled \$527,000 for 2003.

The 2003 ESRF study program funded a number of programs, including the following:

- The assessment of potential effects of exploration activity on ringed and bearded seals in the near shore area of the eastern Beaufort Sea.

- A study to determine the effects of seismic exploration on breeding migratory birds and their habitats in the Kendall Island Bird Sanctuary.
- A Geographical Information Systems analysis and mapping project to integrate survey data on waterfowl and aquatic birds in the Mackenzie Delta.
- A continuation of the waste discharges study of last year, where a technical advisory team, consisting of industry, consultants, the Inuvialuit, and government, undertook a workshop in the North which will assist the development of guidelines and best practices for sumps in the Mackenzie Delta.
- The assessment of the effectiveness of fish deterrents for use under ice in the Mackenzie Delta.
- In the Liard Plateau area of the southern Northwest Territories, a study to assess the impacts of seismic lines on forest songbirds.

The ESRF is managed by the National Energy Board on behalf of the minister. Further information may be obtained from the ESRF website at www.esrfunds.org.

EXPLORATION ACTIVITY IN THE NORTH

Northern Operations

Expenditures on oil and gas activities totalled \$182 million in 2003. This total includes estimated costs for exploration, delineation and development drilling, well completion and abandonment, and geophysical and geological programs. Despite a strong drilling season in the southern Northwest Territories, the marked reduction in geophysical seismic acquisition in the Mackenzie Delta over this last year resulted in lower overall expenditure than in 2002.

Twenty-seven new wells were commenced in 2003, a marked increase over 2002. However, total metres drilled almost doubled to 52,725 metres. The bulk of this new drilling occurred in southern Northwest Territories where a total of 19 new wells were drilled, including eight exploratory, eight delineation and three production wells.

Drilling operations commenced on January 10, 2003 in the southern Northwest Ter-

ritories after a late freeze and on February 7 in the Mackenzie Delta. Winter well operations ended on April 8 in the southern Northwest Territories, but resumed after spring break-up at locations serviced by all season roads. Drilling operations continued until April 21 on the Mackenzie Delta. After a relatively warm December, no new wells had been spudded by year-end.

Only 12 geophysical and geological programs were authorized by the National Energy Board in 2003. This was down from 30 the previous year. This total comprised five seismic acquisition programs totalling 586 kilometres of two-dimensional and 194 square kilometres of three-dimensional seismic, four geological and geochemical sampling programs, two geotechnical programs and one seismic re-processing program which involved no field component.

Southern Northwest Territories

The Fort Liard area saw a major jump in exploratory drilling with 11 exploratory and two development wells drilled. Two exploratory wells were drilled in the foothills west of Fort Liard. Wells in this region generally target the middle Devonian Manetoe Dolomite which form the reservoir in the Liard and Pointed Mountain Fields. Anadarko Liard P-16 was plugged and suspended at 3118.9 metres. This well drilled to a bottom hole location in EL380, east of Chevron's Liard field. On EL381, some five kilometres southwest of Fort Liard, Canadian Forest Oil

drilled Mount Coty 2K-02 well to a total depth of 4731.6 metres. Two development wells were also drilled: Chevron et al. Liard 2K-29 on the Liard Field and Canadian Natural Resources at North Liard 3P-66B. Both wells were completed as gas producers.

An eight well exploratory and delineation program was conducted by Anadarko east of the Liard River on EL383. This eastern flank of the Liard Basin brings the Slave Point to within drillable depth along the trend of the north-south Bovie Fault. Five of

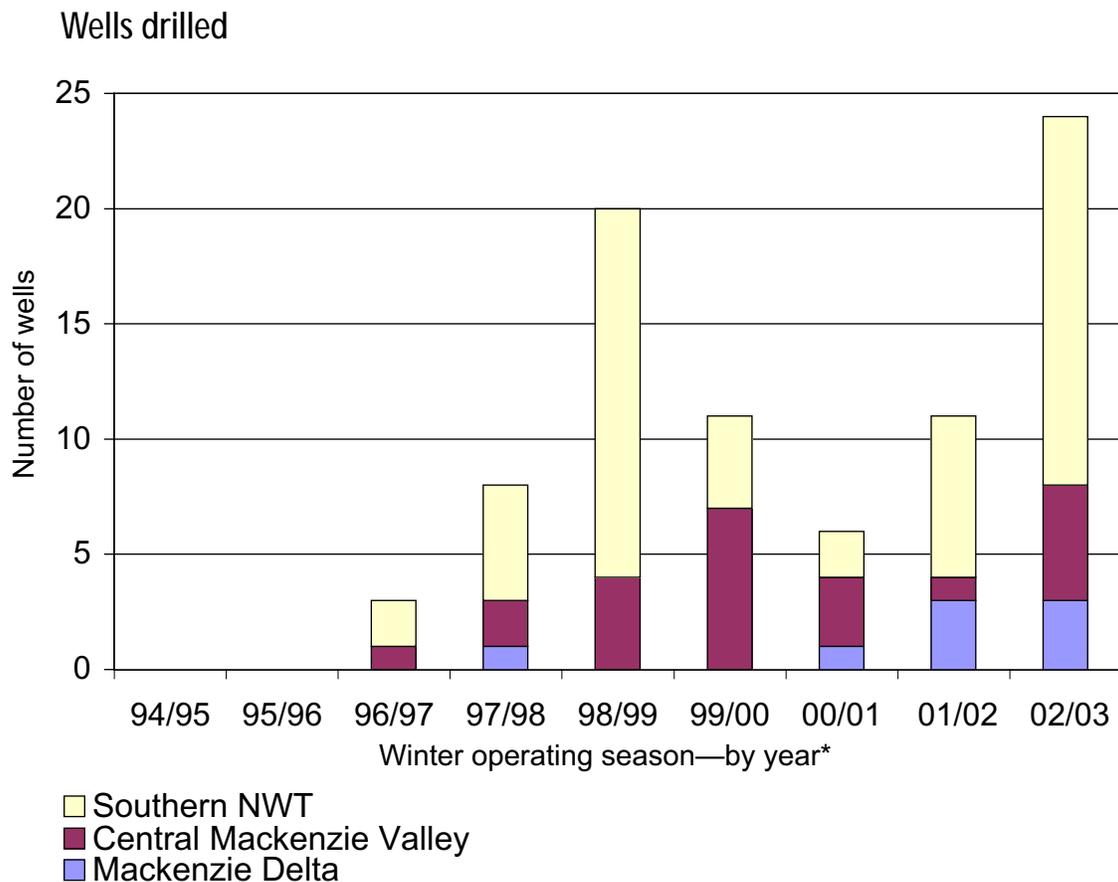
the wells were drilled to this target and the remaining three to shallower targets further west. The company reports significant success from this program and has applied for four significant discovery declarations.

At year-end, two wells — Anadarko Arrowhead River F-56 and K-35 — had to be suspended, pending resumption in the coming year. Two further exploratory wells — Anadarko West Bovie I-76 and Paramount et al. Mackay Lakes K-36 — were drilled on EL382 in the central Liard Basin.

Paramount continued a development drilling program at the Cameron Hills. Between January and March 2003 the company drilled

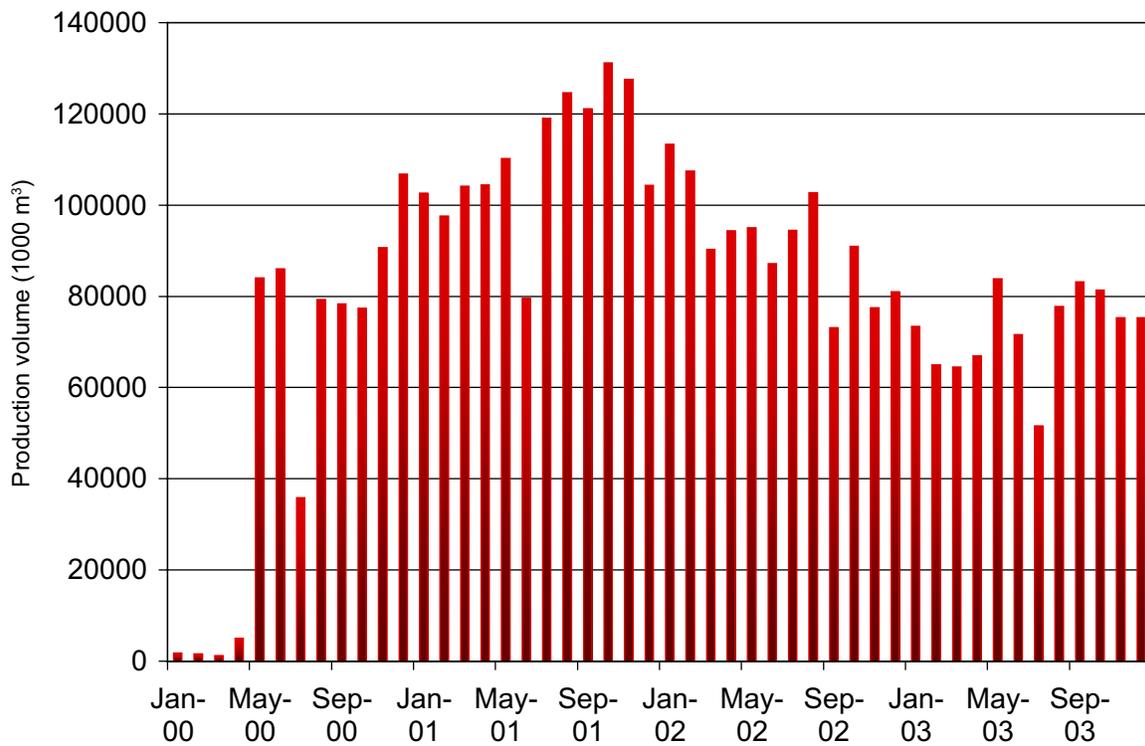
six additional development and production wells all to target depths between 1450 and 1600 metres. By year-end, Paramount et al. Cameron H-58 had been brought on stream as a gas well, and Cameron F-73 and K-74 as oil producers.

The southern Northwest Territories saw a major decline in seismic acquisition programs over the previous year. Only one three-dimensional seismic program covering 77 square kilometres was shot by Trace Exploration over Paramount's Cameron Hills licences. This program was directed at field development: no exclusive or non-exclusive exploratory seismic programs were conducted elsewhere in the southern Northwest Territories.



*Excludes Norman Wells development drilling

Aggregated gas production (southern NWT)



Central Mackenzie Valley

The Colville Hills area of the Sahtu region covers a regionally extensive and proven gas play in Cambrian sandstones. Canadian Natural Resources drilled two exploratory wells on EL400 northwest of the existing discovery at Bele held by significant discovery licence SDL023. Both wells, Behdzia Youh O-52 and Belleh Dukeh D-63, drilled to 1540 and 1570 metres respectively were reported as unsuccessful and subsequently plugged and abandoned.

Further east, on Sahtu private lands held under a concession agreement, Paramount and Apache drilled two exploratory wells at Nogha C-49 and M-17 to depths between 1400 and 1500 metres. Both wells were com-

pleted as gas wells in the Cambrian Mount Clarke Formation.

Elsewhere, Devlan drilled one well on EL386. Devlan Vintage Tree River C-36 was drilled to 1876 metres, plugged and suspended.

Apache conducted two exclusive seismic programs using Trace Exploration: a reconnaissance two-dimensional seismic program of 157 kilometres was conducted at Lac Maunoir on EL399 in the Colville Hills and, subsequently through August and September, a heli-portable seismic two-dimensional program of 60 kilometres was undertaken at Turton Lake on EL414.

Beaufort Sea-Mackenzie Delta Basin

Three new exploratory wells were drilled on the Mackenzie Delta. Chevron Canada Resources announced a gas discovery at its North Langley K-30 well drilled to 1395.3 metres on EL394. The well encountered commercial quantities of natural gas flowing $510 \times 10^3 \text{ m}^3$ (18 mmcf per day) on a restricted choke.

Petro-Canada and Devon drilled the Nuna I-30 well on EL406 at a location just north of the Parsons Lake field on the Tuktoyaktuk Peninsula. This well was suspended at 3240.3 metres and was not re-entered by year-end. On EL405, Devon drilled Devon et al. Itiginkpak F-29 to 1994.3 metres. The well was then plugged and abandoned.

After an intensive effort to acquire seismic data in 2002, geophysical operations on the Delta were cut back dramatically in 2003. Only two programs were run compared with 15 the previous year. Encana undertook one two-dimensional program of 369 kilometres on EL384 and one three-dimensional program of 117 square kilometres on EL385. Acquisition was contracted to Veri-Illuq.

Other industry activity included two geological field parties into the Richardson Mountains, one geochemical sampling program on the Delta, and one offshore geotechnical program.

Nunavut, the northern offshore and eastern Arctic offshore

No oil and gas exploration was undertaken in Nunavut, nor in the northern or eastern Arctic offshore in 2003.

DEVELOPMENT AND PRODUCTION

At year-end seven oil and gas fields were on production in the Northwest Territories. No fields were producing from Nunavut or offshore Arctic waters. Of the producing fields, four gas fields and one oil and gas field are located in the southern Northwest Territories, the Norman Wells oil field in the central Mackenzie Valley, and the Ikhil gas field on the Mackenzie Delta.

Total natural gas production from the Northwest Territories was $980.4 \times 10^6 \text{ m}^3$ in 2003, 18 percent lower than the previous year (see *Aggregated gas production* figure on page 19). The production decline was partly countered by bringing additional wells on-

stream at Chevron's Fort Liard field and by Paramount in the Cameron Hills. Production resumed at CNRL Fort Liard at mid-year after a lengthy shut-in, and oil production was established from the Cameron Hills.

Total oil production was $1283.1 \times 10^3 \text{ m}^3$ (8.1 million barrels). Although 98 percent of this production was from the Norman Wells oil field, additional oil production was brought on-stream in the southern Northwest Territories. Paramount's Cameron Hills field is producing oil as well as gas into a mixed phase pipeline connecting to a processing plant just south of 60°N in Alberta.

Oil and gas production

	1998	1999	2000	2001	2002	2003
Oil Production (thousands of m^3)						
Norman Wells* (G001)	1561.7	1549.1	1434.3	1432.2	1375.4	1254.6
Cameron Hills (G010)	—	—	—	—	1.1	28.5
Total	1561.7	1549.1	1434.3	1432.2	1376.5	1283.1
Gas Production (millions of m^3)						
Norman Wells* (G001)	132.8	126.5	125.6	130.2	123.3	108.6
Pointed Mountain (G003)	25.2	21.0	17.1	9.1	Shut-in	Shut-in
Ikhil (G005)	—	3.3	10.0	13.2	14.8	15.2
Paramount Fort Liard (G006 – "F-36")	—	—	66.3	71.8	38.8	16.5
Chevron Fort Liard (G007 – "K-29")	—	—	490.1	1213.6	834.1	680.3
CNRL Fort Liard (G008 – "P-66A")	—	—	60.1	1.8	Shut-in	9.8
Paramount Southeast Fort Liard (G009 – "N-01")	—	—	—	33.2	61.9	51.1
Cameron Hills (G010)	—	—	—	—	124.1	98.9
Total	158.0	150.8	769.2	1472.9	1197.0	980.4

*Note: Field code "G00X" assigned by the National Energy Board.

Central Mackenzie Valley

Norman Wells (Field Code G001)

The Norman Wells oil field, operated by Imperial Oil Resources, extends beneath the Mackenzie River at 65°20'N latitude. The oil reservoir is a reef of the Devonian Kee Scarp Formation. The field is the starting point of the Norman Wells oil pipeline. Operated by Enbridge Inc., this 300 mm (12") line runs for 866 kilometres south from the Norman Wells field to Zama, Alberta.

Production in 2003 was $1254.6 \times 10^3 \text{ m}^3$ (7.9 million barrels), an eight percent decline over the previous year. By the end of 2003, cumulative production from Norman Wells field reached $34.8 \times 10^6 \text{ m}^3$ (215.6 million barrels). Gas produced with the oil is mainly used for plant fuel or re-injected with minor quantities flared. In addition to crude oil, $8.2 \times 10^3 \text{ m}^3$ (52 thousand barrels) of natural gas liquids were produced and added to the liquids stream.

Mackenzie Delta

Ikhil (Field Code G005)

The Ikhil gas field is operated by AltaGas. The field lies in the Mackenzie Delta, 50 kilometres north of Inuvik, Northwest Territories. Originally discovered in 1983, the field remained undeveloped until 1999. The reservoir is in the Taglu sands (Reindeer Formation) of Eocene Age at a depth of about 1100 metres. Gas is delivered through a buried 120 mm (6") pipeline to Inuvik where it

is used to generate electricity and fuel source for the town. Production in 2002 was $15.2 \times 10^6 \text{ m}^3$ (0.54 billion cubic feet—bcf) with cumulative production totalling $57.5 \times 10^6 \text{ m}^3$ (2.031 bcf). The field continues to produce from two wells (K-35 and J-35) with no evidence of water production. Clear annual peaks in production reflect high local demand over the winter months.

Southern Northwest Territories

Pointed Mountain (Field Code G003)

This field was shut-in in October 2001. The field operator BP Canada Energy re-entered three wells in June of 2003: Pointed Mountain G-62, A-55, and P-53A were abandoned.

Paramount Fort Liard "F36" (Field Code G006)

This field, operated by Paramount Resources, is located 25 kilometres southeast of Fort

Liard, Northwest Territories. Gas is produced from the Mississippian Mattson Formation about 2000 metres below surface. Twenty-four kilometres of 324 mm (12") pipeline (the "Shiha Pipeline") carries the gas south to a processing plant near Maxhamish Lake, British Columbia. Despite the addition of two producing wells (F-36 and O-35) by year-end, production in 2003 was $16.5 \times 10^6 \text{ m}^3$ (0.59

bcf) a decline of 57 percent from the previous year, bringing cumulative production to $193.4 \times 10^6 \text{ m}^3$ (6.83 bcf) at year-end.

Chevron Fort Liard "K-29" (Field Code G007)

The Liard field, operated by Chevron Canada, is located in the foothills northwest of Fort Liard, Northwest Territories and west of the Liard River. The gas reservoir is the Devonian Nahanni Formation in a foothills structure about 3000 metres below surface. The gas here is slightly sour. Gas flows through a 46 kilometre pipeline to BP Canada Energy's Pointed Mountain facility where it joins the current northern terminus of the west coast pipeline system.

One additional production well, Liard 2K-29 was brought on-stream in April 2003. The field now produces from four wells K-29, 2K-29, M-25, and F-25A. Total field production in 2003 was $680.3 \times 10^6 \text{ m}^3$ (24.0 bcf) and cumulative field production to the end of 2003 was $3218 \times 10^6 \text{ m}^3$ (113.6 bcf). With the addition of a new producing well, field production at year-end was comparable to rates in 2002.

Canadian Natural Resources Limited Fort Liard "P-66A" (Field Code G008)

The operator returned to the P-66 location in 2003 and drilled the North Liard 3P-66B well. This was brought into production and flowed from June through October. Gas produced totalled $9.8 \times 10^6 \text{ m}^3$ (0.35 bcf) but high water production caused the well to be shut-in towards the end of the year.

Paramount Southeast Fort Liard "N-01" (Field Code G009)

Annual production was $51.1 \times 10^6 \text{ m}^3$ and rates from the single well in the field showed a 20 percent decline over the previous year. By year-end cumulative production from the field was $146.2 \times 10^6 \text{ m}^3$ (5.2 bcf) with some condensate.

Paramount Cameron Hills (Field Code G010)

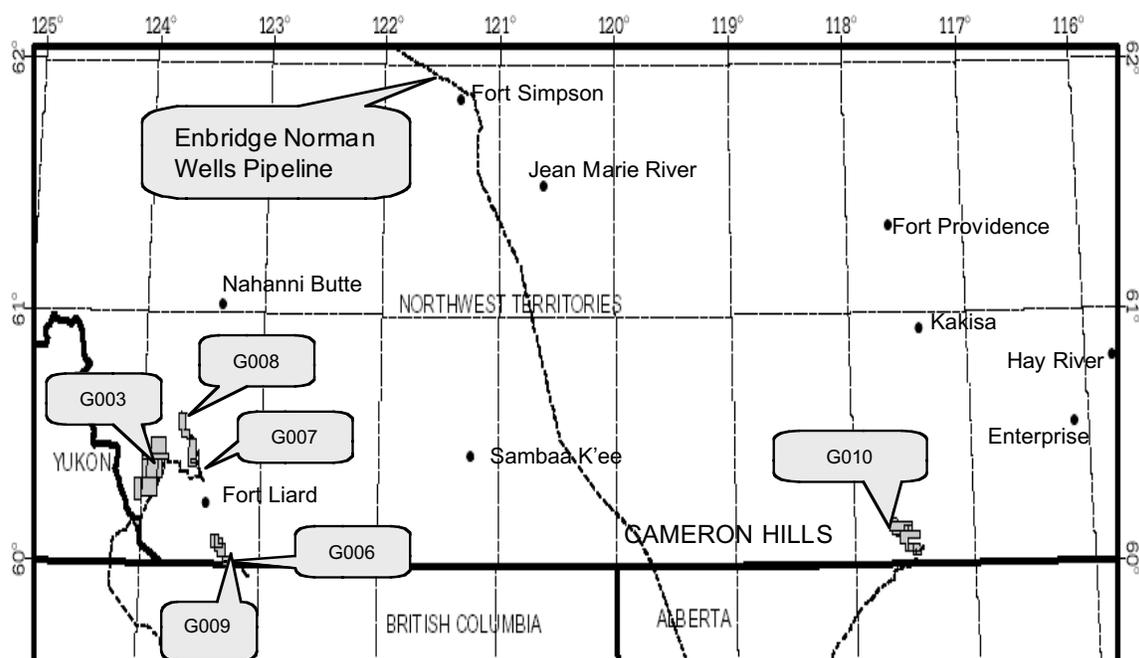
The Cameron Hills are located in the southern Northwest Territories just north of 60°N and west of the Mackenzie Highway. Oil and gas discoveries resulted from a phase of exploratory drilling in the late 1980s and early 1990s. Recently, the field has been the object of a development drilling program by Paramount. In 2003, six new wells were drilled.

Gas production from the field commenced in March 2002. By the end of 2003 four wells (A-73, C-50, N-28, and H-58) were producing gas. One well (J-37) was shut-in in November. Annual gas production was $98.8 \times 10^6 \text{ m}^3$ (3.49 bcf) with cumulative production from the field standing at $223 \times 10^6 \text{ m}^3$ (7.88 bcf).

Sustained oil production from the field commenced in March 2003. For most of the remainder of the year oil was being produced from four wells (C-74, K-74, H-03, and F-73) with total year-end production at 28,482 m^3 (179,146.1 barrels).

Both gas and oil flow to a small diameter pipeline which runs 15 kilometres to a central processing plant near Bistcho Lake, Alberta.

Producing fields – southern Northwest Territories



Field Name	Field Code	Licences
Pointed Mountain	G003	PPL01-09
Paramount Fort Liard "F-36"	G006	PL07, PL08
Chevron Fort Liard "K-29"	G007	PL09, PL11
Canadian Natural Resources Limited Fort Liard "P-66A"	G008	PL10
Paramount Southeast Fort Liard "N-01"	G009	PL12
Paramount Cameron Hills	G010	PL03-05, PL13-18

Drilling statistics – 2003

Well	Lat.	Long.	Class ¹	Depth (m)	Metres 2003	Begun	Rig release	Status ²	Rig	Licence ³
Southern Northwest Territories										
Anadarko Arrowhead River C-55	60.5680	-122.9295	D	3004	2998.9	09-Feb-03	18-Mar-03	P&S	Shehtah4E	EL383
Anadarko Arrowhead River F-56	60.5917	-122.9295	D	2480	2473.1	05-Mar-03	26-Mar-03	P&S	Shehtah5E	EL383
Anadarko Arrowhead River I-75	60.5784	-122.9757	D	2878	2873	25-Jan-03	18-Feb-03	P&S	Shehtah5E	EL383
Anadarko Arrowhead River J-74	60.5598	-122.9814	E	824	819.5	10-Mar-03	16-Mar-03	P&S	Akita15	EL383
Anadarko Arrowhead River K-35	60.5773	-122.8631	E	652	647	21-Mar-03	27-Mar-03	P&S	Shehtah4	EL383
Anadarko Arrowhead River O-38	60.6322	-122.8590	E	2330	2325.8	02-Feb-03	28-Feb-03	P&S	Nabors67E	EL383
Anadarko Liard P-16	60.4306	-123.5329	E	3125	3118.9	01-Feb-03	10-Apr-03	P&S	Akita40	EL383
Anadarko SW Arrowhead M-35	60.4159	-123.1231	E	737	732.3	03-Mar-03	08-Mar-03	P&S	Akita15	EL383
Anadarko West Bovie I-76	60.2597	-123.2228	E	804	585	23-Feb-03	01-Mar-03	P&S	Akita15	EL382
CDN Forest et al. Mount Coty 2K-02	60.1929	-123.5190	E	4741	4731.6	06-Apr-03	05-Sep-03	P&S	Akita62E	EL381
Chevron et al. Liard 2K-29	60.4784	-123.5850	D	3599	3592.3	26-Jan-03	26-Mar-03	P&S	Akita58E	PL09
CNRL et al. North Liard 3P-66B	60.5988	-123.6904	D	3338	3327.6	10-Apr-03	14-May-03	P&S	Akita58	PL10
Paramount et al. Cameron D-49	60.1362	-117.6491	D	1582	1577.5	07-Feb-03	19-Feb-03	P&S	Precision117	PL15
Paramount et al. Cameron F-73	60.0399	-117.4914	P	1459	1454.3	07-Mar-03	15-Mar-03	P&S	Precision117	PL04
Paramount et al. Cameron F-75	60.0748	-117.4864	P	1463	1462.5	10-Jan-03	23-Jan-03	P&S	Precision117	PL13
Paramount et al. Cameron H-58	60.1243	-117.6627	D	1562	1557.4	13-Feb-03	27-Feb-03	PR	Precision249	PL18
Paramount et al. Cameron K-74	60.0613	-117.4909	P	1465	1460.5	24-Jan-03	06-Feb-03	PR	Precision117	PL13
Paramount et al. Cameron M-49	60.1479	-117.6546	D	1505	1500.1	20-Feb-03	05-Mar-03	P&S	Precision117	PL15
Paramount et al. McKay Lakes K-36	60.2618	-123.3663	E	800	796	08-Mar-03	21-Mar-03	P&A	Precision117	EL382
Central Mackenzie Valley										
CNRL Behdzia Youh O-52	66.8658	-126.6650	E	1540	1535.1	03-Jan-03	10-Feb-03	P&A	Akita51	EL400
CNRL Belleh Dukeh D-63	66.7014	-126.7121	E	1570	1565.1	14-Feb-03	09-Mar-03	P&A	Akita51	EL400
Devlan Vintage Tree River C-36	67.2525	-131.8609	E	1878	1874.1	30-Jan-03	26-Feb-03	P&S	Gwich'en 26	EL386
Paramount et al. Nogha C-49	66.6348	-125.8933	E	1409	1403	26-Jan-03	01-Mar-03	P&S	Wilson3	SA
Paramount et al. Nogha M-17	66.6126	-125.8085	E	1471	1465	25-Feb-03	20-Mar-03	P&S	Wilson3	SA
Mackenzie Delta										
Chevron et al. Langley K-30	69.3251	-135.6103	E	1390	1395.3	19-Mar-03	12-Apr-03	P&S	Akita Equitak64	EL394
Devon et al. Itighnpak F-29	69.3251	-135.6109	E	2000	1994.3	11-Feb-03	16-Mar-03	P&A	Akita Equitak65	EL405
PC Devon Nuna I-30	69.1596	-133.3358	E	3250	3240.3	07-Feb-03	21-Apr-03	P&S	Akita Equitak66	EL406

¹ Class E = Exploratory, D = Delineation, P = Production

² Status P&S = Plugged and Suspended, P&A = Plugged and Abandoned, PR = Production

³ Licence EL = Exploration Licence, SDL = Significant Discovery Licence, PL = Production Licence, SA = Sahtu Lands

ROYALTIES

Royalties paid from northern oil and gas production for the calendar year 2003 were \$24,492,180 (net of Investment Royalty Credits [IRCs] \$3,965,606). This year actual royalties were up over 2002 by 24 percent. However, IRCs were up by 227 percent while royalties paid were up by 12.6 percent.

The Sahtu and Gwich'en First Nations also share revenues as outlined by their Land Claim Agreements while the Deh Cho have been advanced a share of revenues as per their Interim Resource Development Agreement.

Regulatory amendments

Recent experience with royalty administration triggered a review of the royalty regulations and royalty assurance: both reviews commenced in 2002 and continued through 2003. Significant consultation occurred on approximately 40 issues during the 2003 calendar year resulting in approximately six contentious issues that are still to be resolved. Government put forth their preferred approach in an industry forum in October 2003 that provided industry an opportunity

to seek clarification and put forth their concerns. Government has been promoting balancing both government and industry interests in addressing the final issues to ensure that the decisions are beneficial for northerners, business, and Canadians. With a meeting anticipated in the spring of 2004, much work has yet to be done, including the review of drafting instructions, before these amendments can be presented to industry and other stakeholders.

Electronic royalty infrastructure

During 2003, the Northern Oil and Gas Directorate initiated the development of an electronic royalty infrastructure. This infrastructure would support the industry in electronic royalty submission and support government in administering, assessing, and auditing royalties in order to provide royalty assurance on royalties collected from oil and gas in the North. Development will be phased and span an estimated two years, with priority areas for development focused on increasing the efficiency of current royalty submissions.

Oil and gas revenues (C\$)

	1998	1999	2000	2001	2002 ²	2003 ³
Royalty ¹	6,967,456	7,138,169	13,433,264	24,656,709	21,751,369	24,492,180
Rentals	7,818	3,245	2,800	993	2,621	978
Issuance/ Registration Fees	2,052	16,766	51,589	12,733	17,800	5,471
Work Deposit Forfeitures	0	289,874	1,342,385	0	2,392,150	954,812
Total	6,977,326	7,448,054	14,830,038	24,670,435	24,163,940	25,453,441

¹ Royalties that are collected are net of any outstanding Investment Royalty Credit balances.

² IRCs for 2002 amounted to \$1,210,473.

³ IRCs for 2003 amounted to \$3,965,606.

Audits and assessments

One audit was undertaken this year and an outstanding audit was finalized. Significant issues were resolved with a number of companies this year, including addressing issues such as failure to file the required royalty submissions and failing to pay royalties — issues that resulted in payment of interest on outstanding royalties. As a result of these issues being re-

solved, the Northern Oil and Gas Directorate did not issue any assessments during 2003. An audit schedule was developed during 2003 that will guide the audits that are undertaken over the next five years. A three year agreement with Consulting and Audit Canada (CAC) was reached in 2003 where CAC will undertake audits on our behalf from 2003 to 2006.

FURTHER INFORMATION

Northern Oil and Gas Directorate

Please check our website first! www.ainc-inac.gc.ca/oil

Many sources of information on oil and gas, environmental, and land use matters originate with the Department of Indian Affairs and Northern Development. To obtain specific information, please include the appropriate contact listed in the sources below with the general mailing address for the department.

Mailing address:

Northern Oil and Gas Directorate
Department of Indian and Northern Affairs
Ottawa, ON K1A 0H4 Canada

Courier Only:

Northern Oil and Gas Directorate
6th Floor, 10 Wellington Street
Gatineau, QC K1A 0H4
Telephone: (819) 997-0877
Fax: (819) 953-5828
Internet: <http://www.ainc-inac.gc.ca/oil>

Information on the resource management regime, calls for nominations and bids, and other related information: Land Tenure – Telephone: (819) 997-0221

Information on registration procedures and regulations, exploration, significant discovery and production licences, transfers, notices, and maps: Rights Administrator/Registrar – Telephone: (819) 953-8529.

Information on northern exploration history and geological/geophysical activities: Senior Petroleum Geologist – Telephone: (819) 953-8722.

Information on Benefits Plan requirements associated with new exploration programs on land in the Northwest Territories is available from the department's Northwest Territories Regional office – Telephone: (867) 669-2618; and for Nunavut and northern offshore the information is available from the Northern Oil and Gas Directorate – Telephone: (819) 994-0348.

Information on royalty policy and royalty submissions: Manager, Fiscal Policy and Royalty Administration – Telephone: (819) 953-9488.

Petroleum Development and Benefits Division
Northwest Territories Regional Office
Department of Indian and Northern Affairs
4914-50th Street, P.O. Box 1500
Yellowknife, NWT X1A 2R3
Telephone: (867) 669-2618
Fax: (867) 669-2409

Other Sources of Information

Through the offices of the National Energy Board at the address below, information on the following is available:

- The Regulatory Support Office has information on exploration, development, production, pipeline transportation, and export.
- The Frontier Information Office provides access to maps, technical information, geological and geophysical reports, well history reports and records.
- The Environmental Directorate provides the Secretariat for the Environmental Studies Research Funds Management Board.

National Energy Board (NEB)
444 Seventh Avenue SW
Calgary, AB T2P 0X8
Telephone: (403) 292-4800
Fax: (403) 292-5503

Geological Survey of Canada Calgary provides public viewing and sampling facilities for cores and samples, and information on wells drilled north of 60°N at its offices at:

Geological Survey of Canada Calgary
3303-33rd Street NW
Calgary, AB T2L 2A7
Telephone: (403) 292-7000
Fax: (403) 292-5377

Information on wells drilled in the Baffin Bay – Davis Strait region is available from:

Core Storage and Laboratory
Geological Survey of Canada Atlantic
Bedford Institute of Oceanography
P.O. Box 1006
Dartmouth, NS B2Y 4A2
Telephone: (902) 426-6127
Fax: (902) 426-4465
Email: hardy@agc.bio.ns.ca