

# Oil and Gas Exploration and Development Activity in Ontario in 2008

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## INTRODUCTION

Drilling activity in Ontario in 2008 decreased compared to 2007, with production levels also falling.

Although world oil prices reached an all time high of \$147.30 per barrel in July of 2008, prices rapidly declined thereafter, finishing the year under \$40. Similarly, the price of natural gas peaked at \$13.31 per MMBtu in July of 2008 but dropped steadily to end the year at under \$7.00, with the decline continuing into 2009. Greatly reduced industrial usage of natural gas during the current recession resulted in smaller than expected withdrawals from storage reservoirs in North America during the winter. In addition to this reduced consumption, new onshore supplies in North America from recently exploited shale gas have contributed to downward pressure on prices.

Production figures compiled from annual production reports submitted to the Petroleum Resources Centre indicate annual oil production declined 11% to 95,875 m<sup>3</sup> in 2008 with an estimated value of \$62.8 million, compared to 107,687 m<sup>3</sup> valued at \$52.3 million the previous year. Natural gas production declined 9% to 265,172 10<sup>3</sup> m<sup>3</sup> with an estimated value of \$95.3 million, compared to 292,731 10<sup>3</sup> m<sup>3</sup> valued at \$82.3 million in 2007. The decline in oil and gas production is directly related to reduced levels of drilling activity since 2004, such that there is insufficient new production to replace that from existing wells. The value of production increased from 2007 to 2008 as a result of the high commodity prices that prevailed during most of the year.

## EXPLORATION ACTIVITY

A total of 57 licences to drill and operate new wells were issued by the Ministry of Natural Resources in 2008, compared to 91 in 2007. An additional 89 licences were issued for plugging of existing wells. One existing well was licensed for oil production from an historical oil field, and 5 existing wells were licensed for production as private gas wells.

Drilling of 62 new wells was reported in 2008, compared to 77 wells in 2007. These consisted of 12 exploratory wells, 24 development wells, 24 service wells, one solution mining well, and one brine production well. The 24 service wells included 15 natural gas storage wells, 1 brine disposal, and 8 stratigraphic tests. One horizontal well was drilled during the year.

Exploratory drilling in 2008 resulted in 3 wells reported as gas producers (one active, two capped), one potential oil well, one reported oil and gas show, and two suspended oil shows (Table 1; Figure 1), with 5 additional wells plugged and abandoned. Successful development drilling was consistent with 2007 results, with 4 wells reported to be active oil producers, 4 as active gas producers, 4 as potential gas wells, one as a gas show, one capped oil well, one active oil and gas well, 5 active private gas wells, and one capped private gas well. This compares with 3 wells reported to be oil producers, 12 as gas producers, and 3 as private gas wells in 2007. Successful oil wells were completed in Silurian and Devonian carbonate reservoirs in Elgin, Huron, Kent, and Lambton counties, with gas completions occurring in Silurian sandstone and carbonate reservoirs in Elgin, Haldimand, Huron, Lincoln, Norfolk, and Welland counties. No wells were drilled offshore Lake Erie in 2007.

The number of successful exploration wells drilled in Ontario was up from 5 in 2007 to 7 in 2008, but down from 14 drilled in 2006, mainly due to an absence of activity on Lake Erie. No single exploration company was seen to be most active in 2008, as only 2 of the 12 exploration wells were drilled by the same operator.

## **Cambrian Play**

Canadian Eastern Oil & Gas Corporation and NRG Corporation each drilled one unsuccessful exploratory well to test Cambrian targets for oil and gas in 2008. Both wells were plugged and abandoned.

## **Ordovician Play**

No exploration or development wells tested Ordovician targets in 2008, compared to three exploration and two development wells in 2007.

## **Silurian Sandstone Play**

Exploration and development of Silurian sandstone targets was down in 2008, with a total of 3 exploration and 14 development wells completed compared to 10 exploration and 23 development wells in 2007. One of the exploration wells was reported to be an active gas producer in Elgin County. Two exploration wells were reported as capped gas wells in Elgin and Norfolk counties.

Thirteen of the 14 development wells were completed for gas, with 8 active, 4 potential gas producers, and one capped well. One was plugged and abandoned in Bayham Pool. Nine of the 14 development wells were industry wells. Three of these were reported as active: 2 in Aldborough Pool and one in Bayham Pool. Four were reported as potential gas producers in Houghton Pool. Six of the 14 development wells were private gas wells, with 5 active in Lincoln and Welland Pools and one capped in Haldimand Pool.

## **Silurian Carbonate Play**

Five exploratory wells were drilled to test Silurian Guelph reef and/or Salina Group structural targets in 2008, compared to 3 drilled in 2007. Three wells were plugged and abandoned; 2 in Lambton County and one in Huron County. One well was reported as an oil show in Lambton County, and one was reported as an oil and gas show in Kent County.

There were 5 development tests of Silurian Guelph–Salina targets in 2008, with one active gas well in Townline Pool, one active oil and gas well in Stephen Pool, one capped oil well in Brigden Pool, one potential gas well in Stanley Pool, and one dry hole in Haldimand Pool. The active oil and gas well in Stephen Pool is the only horizontal well drilled in 2008. This is an increase in activity from the 2 development wells drilled in 2007.

## **Devonian Play**

Exploration and development of Devonian targets was up in 2008, with a total of 5 development and 2 exploration wells drilled, compared to 2 development and no exploration wells in 2007. The 2 exploration wells were both suspended with oil shows in Elgin and Lambton counties. The 5 development wells are all active oil producers in Rodney Pool and operated by Greentree Gas & Oil Ltd.

## **EXPLORATION TRENDS**

Recent exploration has been focused in the proven Silurian sandstone and carbonate reservoirs. High natural gas prices greatly enhance the economics of all gas plays in Ontario. Unfortunately, North American natural gas prices are presently at their lowest level since October 2006.

Exploration in the Ordovician play has declined considerably in the past 5 years with a focus on extension or development drilling of known trends. Essex County and southern Kent County are still the most attractive onshore locations, but exploration will need to expand to the north and east if oil production is to be maintained. There is considerable remaining untested potential for natural gas in this play beneath the eastern basin of Lake Erie and onshore east and north from Kent County to the Niagara Escarpment. A recent reassessment of potential in this play by the Ministry of Natural Resources indicates potential remaining undiscovered resources totalling 201 billion cubic feet [5.7 billion m<sup>3</sup>] of natural gas and 16.6 million barrels [2.64 million m<sup>3</sup>] of oil. There also may be potential for trapping of natural gas in sandy facies of the Ordovician Shadow Lake Formation over the crest of the Algonquin Arch.

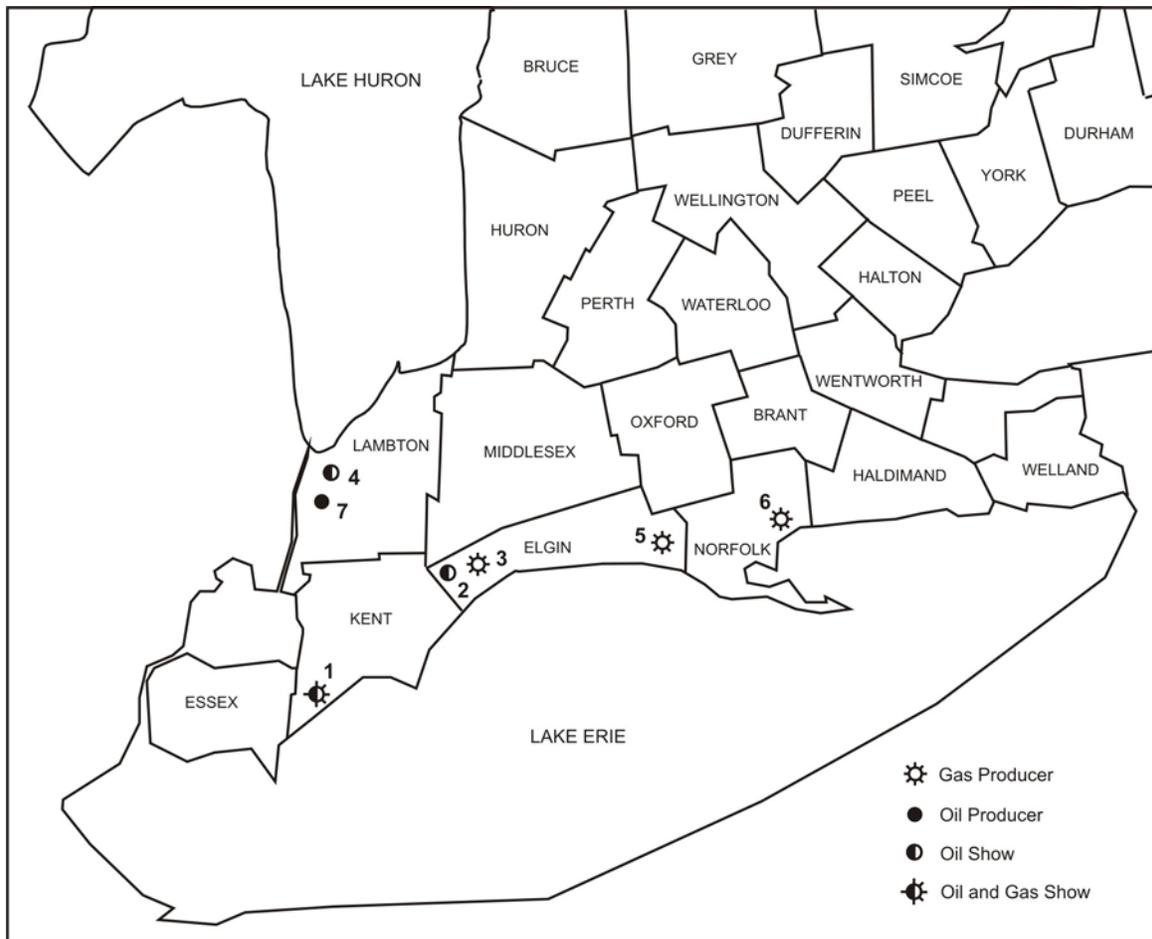
There is potential for discovery of Cambrian gas or oil pools along the pinch-out edge of the Cambrian sandstone in the subsurface, or in fault-controlled structures. There may be considerable unrealized potential in fault-related structural traps in the Salina A-1 and A-2 Carbonate units in Kent, Elgin, and Middlesex counties. There was a significant increase in drilling in the Lower Silurian sandstone play in 2006, but this declined in 2007 and again in 2008.

There is also conceptual potential for a new unconventional gas play in the black shales of the Devonian Kettle Point Formation, analogous to the very successful Antrim shale play in Michigan and the Ohio shales in Ohio. Shows of natural gas have been reported in the Kettle Point Formation in Ontario and in water wells where the Kettle Point forms the bedrock. No scientific studies of its potential have been completed. Other formations with shale gas potential in southern Ontario include the Ordovician Blue Mountain Formation (Utica-equivalent) and the Devonian Marcellus shale.

**Table 1.** Successful oil and gas exploration wells in southern Ontario in 2008 (see Figure 1 for well locations).

Well #	Well Name	Results	Target	TD	Latitude	Longitude	TD Date
1	Onco #31, Tilbury East 8-1-XI	OSGS – POT	SAL	553.2	42.20081111	-82.34349722	3/16/2008
2	GGOL #79, Aldborough 7-8-III	OS – SUS	DEV	150.0	42.60508500	-81.73825722	4/30/2008
3	Wise, Aldborough 2 – 21 – VII	GP – ACT	CLI	542.0	42.62899111	-81.61647750	9/11/2008
4	Den-Mar Brines Limited #14, Sarnia 1-7-6-II	OS – SUS	DEV	213.0	42.92389306	-82.27530444	9/17/2008
5	Riverbend No.1, Bayham 6-5-V	GP – CAP	CLI	408.0	42.73015556	-80.83720278	10/24/2008
6	Metalore No.93, Charlotteville 5-22-V	GP – CAP	CLI	388.6	42.78317500	-80.31920556	12/9/2008
7	Portrush et al # 2, Moore 6- 12-III	OP – POT	SAL	722.0	42.79224111	-82.32717056	12/18/2008

**Abbreviations:** OS = oil show; GS = gas show; GP = gas producer; OP = oil producer; POT = potential; SUS = suspended; ACT = active producer; CAP = capped; SAL = Silurian Salina Group; DEV = Devonian; CLI = Silurian Clinton–Cataract; TD = total depth in metres.



**Figure 1.** Successful oil and gas exploration wells in southern Ontario in 2008.